# ELECTRIC LIGHT CONVENTION.—No. 2.

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## VIEWS, NEWS AND INTERVIEWS.

Like a thief in the night the fire stole upon the Ward Leonard Company's factory, but it happened that the company's orders compelled overtime by all hands, and all were there to do what could be done, which was much indeed, since the working force was utilized in saving all the books, records, data, drawings and other records. Such a complete salvage is seldom the good fortune of the sufferers, and the extent of such fortune can best be realized by those who have suffered from the ravages of the same fiery tongues of the night.

The rapidity with which the average individual accustoms himself to the use of labor and time saving devices and the facility with which he generally forgets that he ever got along without them was strikingly illustrated on one of our Western steam roads the other day, where for some 15 or 20 years a locomotive turntable had been made to place the engines "right end to" through the exertions of two or three muscular yardmen. When one day a small electric motor was placed in the pit and "hooked" to the turning device it was found to work so much quicker and better that the three yardmen were assigned to other duties. All went well until the spring floods filled the pit with water over night, and the next day the motor was sent to be dried out. It was returned by the manufacturers within 24 hours, but during that time the telegraph wires are said to have become decidedly warm from the number of messages urging quick return of the motor.

The bitter fight being waged all over the United States between the Welsbach Light Company and other companies making similar lights has been taken into the courts at St. Louis, and promises to be hotly contested.

## AT NIAGARA FALLS NEXT WEEK

### It is Expected That There Will Be Upwards of 1,000 Persons in Attendance.

THE TWENTIETH CONVENTION PROMISES TO BE A MEMORABLE ONE IN RESPECT TO ATTENDANCE AND INSTRUCTIVE ADDRESSES — SPECIAL DAYLIGHT TRAIN FROM NEW YORK MONDAY MORNING—PICTURE OF A PARTY OF ELECTRIC LIGHT MEN TAKEN NINE YEARS AGO IN FRONT OF THE ELECTRIC CLUB.

The interest in the convention of

ELECTRICAL MEN NINE YEARS AGO—PHOTOGRAPH OF MEMBERS OF THE ELECTRIC LIGHT ASSOCIATION, AND OTHER ELECTRICAL MEN, TAKEN IN FRONT OF THE NEW YORK ELECTRIC CLUB, SEPTEMBER 8, 1888.

In the group are five former presidents of the association, four past secretaries and one present, and almost a score of members of the executive committee of the association. Among the faces to be seen are: Dr. Otto A. Moses, Eugene T. Lynch, Jr., Edwin R. Weeks, Samuel A. Duncan, J. Frank Morrison, A. J. De Camp, Frank Ridlon, W. H. Harding, W. L. Candee, E. F. Gennert, Morris W. Mead, M. J. Francisco, Dr. B. S. Wheeler, George M. Phelps, C. E. Stumpf, T. C. McCoubray, Norman McCarty, C. A. Brown, Allan V. Garratt, P. H. Vanderweyde, J. B. Taltavall, Frank Colvin, Fred W. Royce, H. L. Lufkin, George Redman, Allan R. Foote, Charles Truax, A. H. Patterson, George F. Porter, P. H. Alexander, C. O. Baker, Jr., J. W. Godfrey, H. B. Cram, Capt. T. H. Brady, C. C. Curtis, M. W. Goodyear, B. E. Sunny, Frank W. Harrington, Charles R. Huntley, A. C. Smith, Reuben T. Robinson, Geo. A. Mayo, and M. D. Law. You can find all these and several others if you will search the picture.

the National Electric Light Association, to be held at Niagara Falls, June 8, 9 and 10, next week, is evidently increasing. The office of the secretary in New York has been flooded with communications in regard to the meeting from people who expect to be present, nearly all of whom have made applications for rooms in the two hotels, the International and the Cataract. The master of transportation, Mr. Cyrus O. Baker, Jr., is now sure that the special train over the West Shore road, which leaves New York at 10 A. M., Monday, will be well filled, and the genial master of transportation for once is entirely happy, because he does not have to assign his best friends, whom he knew he could impose upon, to upper berths, as the run is to be made in the daytime and in parlor cars, and the attractive scenery of the Hudson and the Mohawk, between here and Niagara Falls, will be enjoyed by all passengers.

The ELECTRICAL REVIEW presents on its first page this week a group of electrical gentlemen assembled in front of the Electric Club, New York city, some nine years ago, in which our subscribers will see the familiar faces of many distinguished individuals of their acquaintance, some of whom have passed away, the great majority of them, however, being still actively engaged in electrical work. Because of the number of gentlemen who have been identified in an official way with the fortunes of the National Electric Light Association we deem it particularly fitting to present this picture at this time, and beneath it is presented a list of the names of a large number of the party, and our readers will be interested in locating them in the picture and be able to note how kindly time has dealt with all of them during the decade that has nearly passed since the picture was taken.

The convention at Niagara Falls will assemble not quite eight years subsequent to the former meeting held in that city, August 6, 7 and 8, 1889. This August meeting was a memorable one, as it was on this occasion that it was voted to make the ruling power of the association the central station men exclusively; the manufacturers, supply men, and others, not directly engaged in central station electric lighting, coming in as associate members. The meeting at which this change in the constitution and by-laws of the National Electric Light Association was made was a very animated one. The convention became quite excited and got beyond the control of the presiding officer, and Mr. J. Frank Morrison was called to the chair and presided with a skill and force that carried the day for the central station men. He emphasized his decisions with an improvized gavel made of a slab of wood about six feet long and two inches thick, which he found in the Right Upper Entrance of the stage on which the presiding officer sat, the meeting being held in the Niagara Falls Opera House. All appeals from the decision of the chair were knocked on the head with this gavel. This opera house was afterwards destroyed by fire, and probably the most interesting two hours in its history was the set-to on this occasion. The manufacturers and supply men did not particularly object to the associate membership, but they did protest against the way it was done. The words of the old song:

"It perhaps were well to dissemble your love,
But why did you kick me downstairs?"

might have been the remark of the associate members.

It did not take long, however, for good feeling to again predominate as it always has at these gatherings, and the association adjourned to meet at Kansas City after an exciting contest between the advocates of that city and St. Louis.

### Brush Apparatus at Niagara Falls and Vicinity.

The Brush Electric Company has a large amount of electric lighting apparatus in the vicinity of Niagara Falls which will undoubtedly be of interest to visitors to the convention.

The Brush Electric Light and Power Company, of Niagara Falls, was one of the first electric light companies organized in the country. They secured water-power from the company that owned the canal. The property of the old Niagara Falls Brush Company was purchased a few years since by the Buffalo & Niagara Falls Electric Light and Power Company. A new station was erected very near the large power-house of the Niagara Falls Power Company, from which they secure current to run the motors which operate its dynamos.

In this new electric light station may be found four 100 light, 2,000 candle-power Brush arc dynamos, belt driven from motors.

The Brush Electric Light Company, of Rochester, N. Y., has one of the largest arc-lighting stations in the country. These Rochester and Niagara Falls companies were among the first companies in the world to operate electric lighting machinery by water-power.

The Buffalo General Electric Company has a total capacity in its large arc station of about 3,000 lights. This station is located on Elk street. About one-half of these lights are run from 65-light Brush arc dynamos. The balance of them are run from the new, large Brush arc dynamos of 125-lights capacity. There are 11 of these large Brush arc dynamos.

At Lockport, N. Y., there is a large amount of Brush apparatus run by water-power.

Charles Henry Butler, counsel for Eugene Clifford Potter, has filed notice of appeal to the Appellate Division of this department from Justice Beach's order denying to Potter an injunction to restrain Commissioner Collis and the city from permitting the Eighth Avenue Railroad Company, New York, to change its motive power to electricity. This is the taxpayer's suit in which Justice Beach decided that the city had lost any right to acquire the railroad by paying the cost of the property and 10 per cent added.

### THE DIRECT-CURRENT TRANSFORMER.

ABSTRACT OF A PAPER READ BEFORE THE CHICAGO ELECTRICAL ASSOCIATION MAY 7, 1897, BY C. THORDARSON.

The transformation of energy is at present, more than ever before, the main problem on which electrical and scientific men are working all over the world.

Viewing this subject from a practical standpoint, there are only two methods at present known which are worth considering.

One is using the storage battery. This necessitates a continuous-current source, or an alternating current rectified by means of a synchronizing commutator. The other is the magnetic induction method, which requires an apparatus in which either the conductor or the magnetic field is moving, as an ordinary dynamo, or a changing magnetic field set up by an alternating or pulsating current supplied to it. A transformer of this kind, having no moving parts, and requiring so little attendance, it has frequently been found preferable to use it, and to construct alternate-current machinery, giving a frequency best suited for its use. This is the only recommendation that can be given or assigned to the alternating current—the simplicity and cheapness of transforming it. In almost every other respect it is objectionable. It requires larger conductors than the direct current, and is more apt to produce all kinds of induction troubles in its own conductors and neighboring lines. The use of the alternating-current transformer is at present limited to electric lighting and to power transmission in connection with polyphase-current working.

The direct-continuous current is the ideal method for transmitting electrical energy, and it has advantages over the alternating current in almost all cases, and embraces a broader field, as, for instance, the operation of the telephone and telegraph systems which can not at present be operated in any other way.

The objections to the direct current transformer are not so much questions of efficiency, as it is the first cost and running expenses. An apparatus having bearings, commutator and brushes, will necessarily cost more than one having only two coils incased in a stationary magnetic field. A direct-current transformer of over 75 kilowatts of capacity can be designed so as to require very little attendance, and experience has shown that an alternate transformer of the same outfit does require some attendance. Here, therefore, the difference between the two is not very great. When we come to the transformation in very small units, the running expense of the direct-current transformer has frequently been so high that it could not compete with an alternating current.

Here there is a considerable field for improvement; viz., reducing the cost of attendance, and the only parts that require occasional attention are the bearings and the commutator and brushes. The perfection of these parts will make the machine profitable to use in many cases where before it was impracticable.

The lateral pressure on the bearing can be entirely prevented by having the armature core of the same width as the field magnet poles, and the free space between the bearings and commutator the same as the length of the air space from armature core to field cones. But these proportions are only approximately true, and will vary some with slotted and surface-wound armatures. When so designed the magnetic field will hold the armature absolutely free from all lateral thrust under all variation of load.

The bearing friction caused from armature and commutator weight can be greatly diminished by mounting the armature eccentric above the center in its running space. In this way the pull of the magnetic field will in smaller machines almost entirely counterbalance the weight of the armature and commutator. These are peculiar advantages of the rotary transformer, there being no pressure on bearings from ropes or belting, as the power is only transmitted between coils that are mounted on the same armature core.

To diminish bearing friction caused by armature weight, it is profitable to use the bi-polar type on small units and to avoid friction from lateral thrust; all types having the field poles by the side of the armature, as the Brush machines, are objectionable.

The wear of commutator and brushes is a subject that has been well studied on dynamos and motors, and combinations have been found that are giving good results, and they give far better results when used on the rotary transformer, because in them magnetic reaction between the primary and secondary circuits in the armature is so well balanced that no sparking from magnetic induction can take place under any variation of load, neither on the primary or secondary commutators.

In working out various designs of direct transformers the idea of rotating brushes and keeping all the other parts stationary will naturally suggest itself. Considerable experimenting has been done in this direction, especially by the Westinghouse and General Electric companies, but very little of this information has found its way into print. A year and a half ago I designed and constructed a machine on this plan, taking an ordinary laminated ring slotted on the external edge, and into each slot was wound one primary and one secondary coil, and over this ring was slid another laminated ring of the same width and sectional area, thereby encasing each pair of coils in a closed magnetic field; the leads were connected to a stationary commutator. Inside of the ring was mounted on a vertical shaft a field magnet of sufficient strength to produce rotation, and on this shaft were secured the arms, carrying brushes, and collector rings. The results might have been predicted. Each pair of coils acted as if it were an independent static transformer.

We have in both cases induction and an immense amount of sparking, and the sparking is so violent that it is difficult to run the apparatus even through an experiment.

Rotary transformers for transforming direct to polyphase, or polyphase to direct, are constructed essentially the same as direct-current transformers.

Direct-current transformers are at present chiefly used for operating telegraph and telephone circuits. For telegraph circuits the machines are required to give varying electro-motive force. For that reason the primary and secondary circuits must be in two independent magnet fields, for no satisfactory variation of electro-motive force on the secondary can be made in any other way. The simple direct-current transformer having primary and secondary circuits in the same magnetic field will vary its speed to maintain constant electro-motive force on the secondary.

# THE INDEPENDENT TELEPHONE COMPANIES.

## A National Organization Formed in Chicago Last Week.

THE FIRST CONVENTION IS TO BE HELD IN DETROIT, JUNE 22—HON. J. M. THOMAS, OF CHILLICOTHE, OHIO, ELECTED CHAIRMAN—OVER 100 INTERESTED TELEPHONE MEN PRESENT, REPRESENTING THE INDEPENDENT EXCHANGES IN ALL PARTS OF THE UNITED STATES—EXECUTIVE COMMITTEE OF TWO MEN FROM EACH STATE—RESOLUTIONS AND ADDRESSES, AND NAMES OF MANY IN ATTENDANCE.

Pursuant to a call issued by Mr. James E. Keelyn, president of the Western Telephone Construction Company, over 100 representatives of the 1,000 or more telephone exchanges, independent of the Bell company, met in Chicago on May 27, and after two days' session, during which an organization committee, as well as several auxiliary committees were appointed, adjourned to meet again in Detroit, on June 22, 1897, when undoubtedly a permanent organization will be perfected.

The main things contemplated are as follows:

A national association of the 1,000 operating telephone exchanges of the United States, independent of the Bell company for mutual protection and development.

Long distance toll line connections by the combination of various independent telephone exchanges of the country.

The establishment of an independent long distance service, connecting the great commercial centers in a field now occupied exclusively by the Bell company.

Co-operation for resisting any action the Bell company may take in the courts in reference to the Berliner decision.

No other meeting place having been arranged for beforehand, the delegates, as they arrived, assembled at the office of the Western Telephone Construction Company, where the first preliminary meeting was called to order Thursday morning, Mr. Jas. E. Keelyn being made temporary chairman. It was soon found that, owing to the rapidly increasing number of new arrivals, the hall provided by the company became too crowded and also on account of more or less interference from factory noises, more suitable and larger quarters were desirable. On motion of Mr. Tom Marshall, of Keithsburg, Ill., the meeting adjourned to reassemble at the Palmer House, where, in the meantime, a large assembly hall had been secured.

Before the morning session adjourned, W. J. Vesey, Fort Wayne, Ind., was appointed secretary of the convention, and the following were appointed as members of the executive committee:

T. A. Marshall, Keithsburg, Ill.
George W. Beers, Fort Wayne, Ind.
H. C. Young, Columbia, Penn.
Angus Leek, Cairo, Ill.
J. L. Stone, Rushville, Ind.
D. H. Gilbert, East Saginaw, Mich.
L. D. Robinson, Washington, Iowa.
C. Truitt, Columbia, Mo.
D. M. Burke, Carbondale, Ill.
S. T. Slade, Oskaloosa, Iowa.

The executive committee met at one o'clock, Palmer House, Mr. T. A. Marshall in the chair. The convention met at three o'clock in balcony room, Mr. J. E. Keelyn in the chair. The temporary chairman, Mr. J. E. Keelyn, and the temporary secretary, Mr. W. J. Vesey, were made permanent.

The chairman of the executive committee reported that the committee would recommend the appointment of two members from each State as a committee to be known as the executive or general committee; that the sub-committees, such as may be required hereafter, be selected from the body of the executive committee. The committee on permanent organization selected the following names from the different States:

ILLINOIS.
T. A. Marshall, Keithsburg, Ill.
Dr. I. A. Lumpkin, Mattoon, Ill.

MR. J. E. KEELYN, PRESIDENT WESTERN TELEPHONE CONSTRUCTION COMPANY. FIRST PRESIDING OFFICER OF THE INDEPENDENT TELEPHONE DELEGATES.

INDIANA.
Hugh Dougherty, Bluffton, Ind.
J. L. Stone, Rushville, Ind.

PENNSYLVANIA.
C. R. Savidge, Sunbury, Pa.
H. C. Young, Columbia, Pa.

MICHIGAN.
W. H. Gilbert, Saginaw, Mich.
D. McVichey, Ishpeming, Mich.

IOWA.
S. T. Slade, Oskaloosa, Ia.
A. T. Averill, Cedar Rapids, Ia.

WISCONSIN.
Wm. H. Lohmiller, LaCrosse, Wis.

MISSOURI.
H. E. Ralston, Maryville, Mo.
Ed. C. Baker, Cameron, Mo.

KENTUCKY.
W. B. Seaton, Ashland, Ky.
H. K. Cole, Owensboro, Ky.

WEST VIRGINIA.
H. E. Mathews, Huntington, W. Va.
J. M. Payne, Charleston, W. Va.

VIRGINIA.
W. P. Roberts, Lynchburg, Va.
S. A. Duvall, Richmond, Va.

MARYLAND.
Charles E. Fink, Westminster, Md.
Clarence Hodson, Baltimore, Md.

NEW JERSEY.
W. H. Rankin, Elizabeth, N. J.

NEW YORK.
D. C. Dow, Cobleskill, N. Y.
I. A. Evans, Rome, N. Y.

MINNESOTA.
Wm. Hayes Laird, Winona, Minn.

TEXAS.
L. C. Ketcham, Palestine, Tex.
E. L. Bacon, Beaumont, Tex.

SOUTH CAROLINA.
R. B. Lebby, Charleston, S. C.
J. H. Twichell, Spartansburg, S. C.

NORTH CAROLINA.
W. Newton Smith, Tarboro, N. C.

VERMONT.
Geo. H. Almon, Montpelier, Vt.

NEW HAMPSHIRE.
F. W. Story, Laconia, N. H.

MISSISSIPPI.
W. B. Stewart, Natchez, Miss.
E. S. Crane, Yazoo City, Miss.

OHIO.
J. M. Thomas, Chillicothe, Ohio.
H. D. Critchfield, Mt. Vernon, Ohio.

TENNESSEE.
L. P. Padgett, Columbia, Tenn.

KANSAS.
W. C. Hewitt, Leavenworth, Kas.

The States left blank are to be filled by names suggested by those present in the convention.

This report of the executive committee was adopted.

The meeting adjourned to meet nine o'clock Friday morning at club rooms, Palmer House.

FRIDAY'S MEETING.

At the opening of the morning session, the chairman, Mr. J. E. Keelyn, offered his resignation, speaking as follows:

GENTLEMEN OF THE CONVENTION: It is my pleasure and duty to offer to this convention my resignation as its president, which had been contemplated from the beginning. When this matter was first brought up it was thought, for the purpose of a preliminary organization, I best might act as chairman; that a call from me would be answered somewhat fully. In carrying out the line of that preliminary organization I may have engendered some bitterness—my motives may have been misconstrued. I trust that you may select some one now against whom no reflection of mercenary motives can be had.

It will be my further duty to help the association, or this convention, to a successful end. I shall be glad to use what efforts I have in that direction so long as I find that it is in the interests of the independent telephone movement, without regard to any class or any phase.

I thank you very kindly for such assistance as you have given me so far. I am thankful for the

*Courtesy "The Telephone."*

HON. J. M. THOMAS, OF CHILLICOTHE, OHIO, CHAIRMAN CONVENTION INDEPENDENT TELEPHONE COMPANIES.

honor conferred upon me. I trust that the convention may elect some one suitable in my place, to its great good.

On motion, Hon. J. M. Thomas, of Chillicothe, Ohio, was nominated as chairman; who accepted the position, and addressed the meeting at length. In order to promote further harmony a tacit understanding prevailed among those interested in promoting the organization, that Mr. Keelyn should occupy the chair during the preliminary organization. It was considered that antagonisms would arise during this preliminary organization. Mr. Keelyn seemed willing to accept the responsibilities and assume any charges of unfairness such as usually attach to a chairman presiding at a preliminary organization of this kind, where conditions, of course, involve a more or less discordant element. The permanent chairman, it was desired, should enter upon his duties without any entailment of the past. The personal sacrifice upon Mr. Keelyn's part is well known by the members of the executive committee, and is quietly voiced in the opening sentence of Judge Thomas's speech, which was as follows:

ADDRESS OF THE PRESIDING OFFICER.

GENTLEMEN OF THE CONVENTION: When a man is willing to do anything in reason for the furtherance of an honest cause he is always to be applauded. I can not believe, gentlemen of the convention, that there is any real, true foundation for a difference of opinion on the part of men representing different States at this meeting as to the material points to be taken up at a meeting for national organization. We came fresh from our homes with one desire, and that is we shall get closer together, become personally acquainted with each other, learn the motives of each other, and form an organization that will be effective as a means of promoting the telephone interests of these great United States. No man should come to a meeting of this kind for selfish purposes, and I believe that there is no man present at this Chicago meeting, if he has a selfish motive, if properly approached, is not willing to lay aside that motive for the general good of all. This movement is very important. When you stop to consider that we represent the interests of the people outside of a few financially interested parties in a monopoly, and that in connection with that fact, that we represent probably $25,000,000 or $30,000,000 capital invested in the telephone movement in the United States, it is a matter that is so serious that we can not afford any petty notion or selfish motives to intervene and interfere with the progress of a meeting of this kind. I have always been of the opinion, gentlemen, that the great majority of men who have invested their money in independent telephone exchanges throughout this country have done so particularly through an unselfish motive. I know very well that the great majority of men with whom I have conversed on this question have been led into this movement simply with a desire to reduce telephone rates to a point to which they think they should be reduced, after the expiration of the patents covering these inventions, and while we nearly all, or quite all, took the matter up in the different communities with that view, after seeing that it was a fair business investment, we have in every instance put more capital into the matter than we originally intended to place in the enterprise. When we started to reach a certain end, we were bound to accomplish it, no difference what the cost. That feeling will save any independent telephone movement in this country from defeat and from slaughter, and there are enough men here in this meeting to-day, if they get together, and in their wisdom follow this matter out as it should be done, to defeat the Bell telephone monopoly in the United States. [Applause.]

I do not believe, outside of the technical attorneys who have been employed by the Bell Telephone Company, that they have within their officers so much brains as are represented in this meeting to-day. [Applause.]

The independent telephone people of the United States should act wisely and judiciously, and adopt a policy and stand together.

Now, if you are not in this business for an unselfish purpose, if you are not willing to stand by the guarantee to place yourself in the fore front, to take the chances of being wounded or hurt financially, I say you had better go home. You had better get out of the telephone business in a hurry and let somebody in who is brave enough to make a fight against that which is wrong.

The United States of America, as in all cases of dealing with its people, have adopted a policy in patent matters in which they are willing to give every inventor full protection for a certain number of years upon his invention. That is right. That is justice. That is what a country should do for her ingenious people who can evolve from their brain useful inventions. We have no quarrel with the Bell Telephone Company because they have been able to accumulate immense millions of wealth out of these very useful and important inventions. Simply because these inventions have been found a necessity, have been found useful, that fact alone has made the owners of those inventions immensely rich; and it is right and proper that if they were fortunate enough to get into a position and become wealthy on account of the protection given to them by the government on account of these inventions, I say well and good, and amen. But it is quite a different question, that through some hook or crook, that monopoly, who has already grown immensely rich on account of the smartness or greatness of some lawyer, to again take a new lease of life upon their inventions, and to destroy the millions of dollars which are invested by the people of this country on patents believed to have expired, then is when we reach the point that the people—the common people of this country—should take up arms and carry on warfare against that monopoly.

I have seen intimated in some journals since this recent decision that the independent movement does not deserve sympathy, because it is composed of a body of men who are simply trying to get into the field and get money out of it. I pity the poor editor who will allow such trash to go into his journal. I want it distinctly understood now and forever that we who meet here to-day are men who have not been selfish; at least, our motive has been unselfish enough to bring about a right and just reduction of telephone rates to the people in the different communities. In other words, I believe, gentlemen, that we have been more patriotic than selfish in this movement. I thank you very kindly for having so unanimously chosen me to preside at these deliberations. I am informed that the executive committee, appointed at your meeting yesterday, is now ready to report. We will hear that report.

REPORT OF THE EXECUTIVE COMMITTEE

Your executive committee begs leave to report to your honorable body, the following as the result of their deliberation:

After a general and full discussion of the advisibility of organizing or forming a national association of independent telephone companies in the United States, the following resolution was unanimously adopted and ordered to be reported to the convention as their report:

*Resolved*, that the executive committee, as now constituted and provided for, shall be continued until discharged, at or after the meeting to be called for the formation of a national association as hereinafter provided; that said meeting shall be called to meet within 30 days from this date, the time and place of which to be fixed by this executive committee. The meeting to be called for such place as in the judgment of said committee will secure the largest attendance; that steps be taken to notify every local exchange in the United States, together with the owners or operators of toll line service of such meeting, and a request that it be represented by at least one person authorized to act for and bind such exchange or toll line company; that the call for said meeting shall be signed by the members of this executive committee, and in event there be present from any State a person interested as an operator of telephones, but who is not a member of this executive committee, and in the further event of such State having no executive committeemen, then the call to be also signed by any and all such persons not exceeding two from any such State; that said call shall not be signed by any person interested as a manufacturer or a vendor of telephonic apparatus or supplies; that said committee shall have power to fill vacancies should any exist or occur, and add to said committee by appointing or selecting not more than two members from any State not now represented on said committee, which, in the judgment of said committee, may be desirable; said committee to prepare a draft of a constitution and by-laws to be presented for adoption at the meeting hereinbefore provided to be called; that said committee also prepare a plan for the permanent organization of a national associa-

(*Concluded on page XXI.*)

### A New Air-Brake for Trolley Cars.

A new type of air-brake has been undergoing a prolonged and successful test on the cars of the Yonkers, N. Y., street railway company. It embodies some features apparently new in this field. The locality is especially trying, owing to the frequent recurrence of heavy grades, reaching in some cases above 10 per cent and many of them quite long. In such cases, and often on levels, a serious obstacle to the successful working of air-brakes has been the loss of air-pressure in the reservoir, due to the frequent application of the brakes.

The new brake is the invention of Henry L. Howe, of Canandaigua, N. Y., a practical machine designer of many years' experience. His idea has been to construct a brake system, in which the reservoir pressure would be maintained constant, effected by an air-pump, clutch-geared to the car-axle, and set going only upon the brakes being applied, thus utilizing the inertia of the car to effect its own stoppage, to maintain the pressure and to govern the stopping of the pump automatically.

In the Howe system, the main reliance for maintaining the pressure is in the fact that, every time the motorman attempts to reduce his pressure by applying the brakes, he positively offsets it by starting the pump. There is no "live" power needed to compress the air, and the conditions of safety, reliability and economy are combined.

The parts are: reservoir, brake-cylinder, operating valve, operating handle, and combined pump and clutch-governor. The pump consists of two cylinders, with single-acting pistons and cranks set opposite each other on a shaft normally clutched to the gearing. The valves are directly in the heads of the cylinders, the cranks and working parts being inclosed in a casing full of oil. The pump is secured to the car-truck by bolts from suitable channel, or angle irons attached to the truck. The gearing to car-axle is flexible by means of steel links forming an A, which hold parallel the car-axle, intermediate shaft and pump-shaft, and the gearing is cased. Track hammering can, therefore, do no damage to the pump.

The operating valve is moved by rods running to each end of the car and connected to the operating handle on the platform, which stands over a dial with the words "On," "Off," and "Hold," the latter being between the two former.

In normal position, the clutch is engaged and the pump operates when the car starts out from the barn, and continues to do so until the working pressure in the reservoir has been reached, when the automatic governor operates its piston and opens the clutch, whereupon the pump stops. Any reduction of this pressure causes the governor to react, closing the clutch and starting the pump.

The motorman, in applying brakes, pulls the operating handle to the "On" position. This first operates positively to cause the clutch-governor to close the clutch and start the pump, and, second, allows the pressure to flow to the brake cylinder. Hence, while the car, with the current shut off, is running to the stop caused by the air in the brake cylinder, the pump is in operation, not only replenishing the air used to make this stop, but also utilizing the undesired momentum of the car. Obviously, such arrangement will automatically compensate for any leakage.

The pump is so designed as to compress at least as much air as is used in making the stop, and do it in the distance traveled by the car while stopping, and frequently, after making a series of stops or slow-ups in quick succession, there is, paradoxical as it may seem, more pressure in the reservoir than when the first stop was made. The clutch operates accurately, the jaws snapping into full connection at once and releasing readily, no appreciable wear appearing after long service. This is due to the pump always stopping "on center," making engagement and disengagement easy.

The motorman has complete control of the car. He can apply the brakes to a greater or less amount, hold any pressure he likes on them and put them on and off as often as advisable, without being restricted, because the pump will take care of the pressure in the reservoir, and he is always sure of air.

---

The report of the Nassau Electric Railroad Company, of Brooklyn, N. Y., for quarter ended March 31 shows: Gross earnings, $334,540, increase, $257,607; operating expenses, $222,-131, increase, $165,805; net earnings, $112,409, increase, $91,802; other income, $30,736, increase, $30,736; total income, $143,145, increase, $122,538; fixed charges, $142,772, increase, $122,359; surplus, $373, increase, $178.

### Armorite Interior Conduit Company Moves to Pittsburgh.

The rapidly increasing popularity which Armorite interior conduit has achieved under the able and progressive management of Mr. James F. Cummings, has necessitated the securing of larger manufacturing facilities in order to keep pace with the demand for this high-grade product. The manufacturing plant has, therefore, been removed from 478 to 482 Fort street, west, Detroit, Mich., to Second avenue and Brady street, Pittsburgh, Pa. The new plant has been in operation about a month, and is probably the best equipped and most modern establishment for the making of interior conduit and tubing in this country to-day. The capacity of the plant is sufficient to supply orders of any size. The line of manufacture produced by the Armorite Interior Conduit Company at its new Pittsburgh plant includes every kind of interior conduit, from what is claimed to be the finest coated tube on the market to an insulated tube lined with one of the best known and most satisfactory insulating mediums. Furthermore, Mr. Cummings states that owing to the Armorite Interior Conduit Company's increased facilities they are prepared to supply their goods to the trade cheaper than has ever before been possible. The company and its management are both to be congratulated on their rapidly increasing business, which is undoubtedly due to the merits of their goods.

---

A new street railway bill has been prepared for the Illinois Legislature to take the place of the Humphrey bills recently defeated in the lower house of that body. This latest measure differs from the defeated bills chiefly in that it makes the extension of franchises 35 instead of 50 years, and prescribes a five-cent fare for 20 years, and says that for the remaining 15 years the fare can be fixed by the municipal authorities.

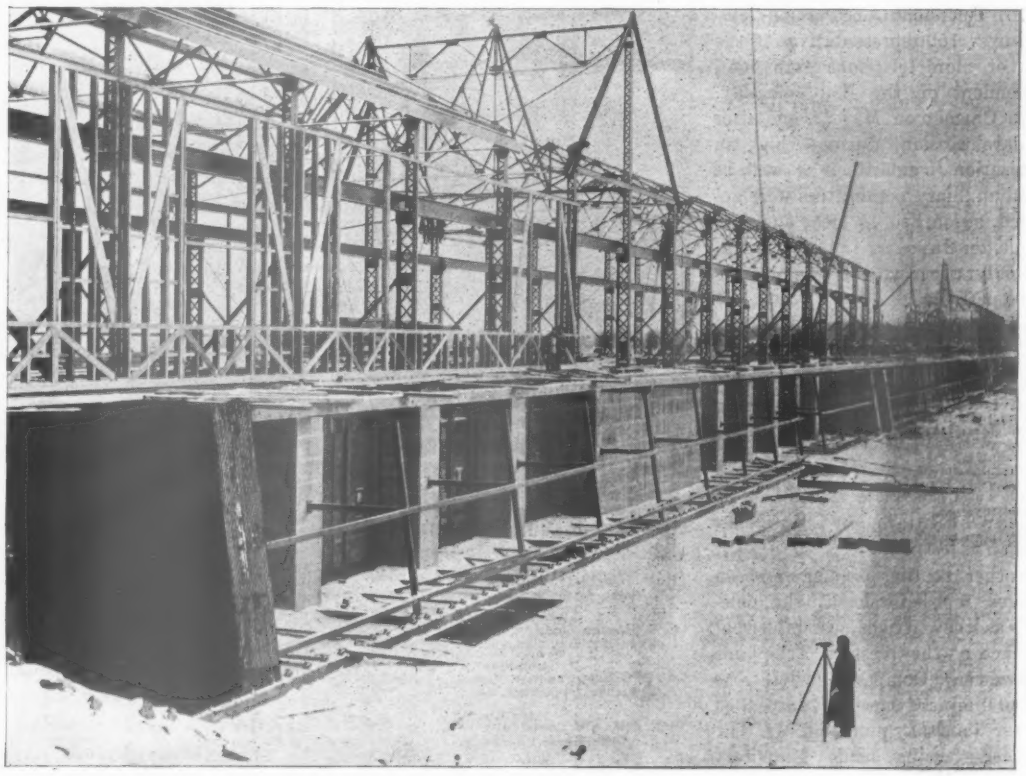

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FIG. 1.—HARNESSING LACHINE RAPIDS.—STEEL FRAME OF POWER-HOUSE.—View also shows the flumes with vertical sliding gates in position, and iron grating ready to be set.

### Lachine Rapids Power Plants.

Montreal follows Niagara Falls, and decides that the great power of Lachine Rapids shall be harnessed for her benefit.

The idea of utilizing this great power was first broached in 1868, but the project never took definite shape. In 1895, thanks to the development of electric machinery and distribution for power purposes, the scheme crystallized, and the Lachine Rapids Hydraulic and Land Company was organized, and given permission to construct the necessary works at Lachine, install pole and underground lines all through Montreal, contracts were let, work actually begun, and soon Montreal and its environs will be using light and power taken from the natural forces of the falls.

We are indebted to our esteemed contemporary, the Buffalo *Express*, for the illustrations we give of this striking enterprise.

The officers of the company are: G. B. Burland, Montreal, president; Alexander Fraser, Ottawa, vice-president; W. McLea Walbank, B. A. Sc., managing director; Mayor R. Wilson Smith, Montreal; Peter Lyall, Montreal; E. Kirk Greene, Montreal, and S. Carsley, Montreal, directors; T. Pringle & Son and McLea Walbank, engineers.

The contractors for water-wheels and hydraulic machinery, Stilwell-Bierce & Smith-Vaile Company; for electrical machinery, the Canadian General Electric Company; for wire work, the Dominion Wire Works; underground conduits, the National Conduit & Cable Company, of New York.

Many engineering difficulties were encountered, not the least of which was a big reef of rock just where it was not wanted. This was finally blasted away. The head race was then built. It is 4,000 feet long and 1,000 feet wide, having an average depth of water of 13 feet. The tail race measures 1,200 feet in length

and is from 1,000 to 1,500 feet wide, being 10 feet lower than the bottom of the head race.

The main dam upon which the power-houses and wheel-sheds are built is of cut stone and runs from the shore to the wing dam, a distance of 1,000 feet. It is constructed so as to form 43 flumes, including the waste weirs, and in each of these flumes are set two turbine wheels. At the mouth of each flume are two vertical sliding gates and a system of stop logs at the lower end. In front of the gates, from one end of the dam to the other, is an iron grating, made to keep off the debris and floating driftwood from the turbine wheels. There are 72 of these wheels, set perpendicularly, so that the water enters them from above and passes out at their base; they are of "Victor" make and arranged six to each dynamo, there being 12 of these latter machines.

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FIG. 2.—SOME OF THE TURBINES WHICH WILL TAKE POWER FROM LACHINE RAPIDS.

The power-house is a fireproof building of about 1,000 feet in length, composed of three dynamo houses and three turbine sheds. The generators make 175 revolutions per minute, generating current at 4,400 volts. A traveler, or truck, capable of carrying 25 tons, runs the whole length of the building, and will be used for moving any machinery that may be required. Starting from the power house is a pole line made of lattice steel poles and fitted with cross arms. From this the electric power is carried by wires as far as the outskirts of the city and then passes under ground until it reaches the sub-station.

The company has also a large section of land which faces on the works, and has laid it out in building lots, which are being rapidly bought up, and already some handsome Summer residences are being erected. As the hydraulic works are only five miles from the center of the city, and those who build there will have the advantage of cheap electric light, good car service, and a capital view of the river and rapids, it is quite probable that this will become one of the most popular watering places on the St. Lawrence.

For the benefit of those who intend "shooting the rapids" this Summer, it might be as well to mention that the dams and power-houses will not in any way interfere with the scenery or alter the state of the river itself, and there will be just the same amount of excitement derived by "nearly running on the rocks!" as of yore.

Montreal is to be congratulated on her progressiveness, and its result in the acquisition of such a fine power plant.

## Strike of Electrical Workers at Milwaukee.

On Monday of last week some of the electrical workers, members of local union, No. 2, at Milwaukee, quit work, pending the settlement of difficulties between the union and the electrical contractors, Jul. Andrae & Sons Company, Rohn & Meyer, Keelyn & Smith, and Peteman & Walber. The union demands 31¼ cents per hour as minimum wages, eight hours per day, and certain rules regulating the employment of helpers and apprentices. The contractors are willing to accept eight hours per day, with time and a half for overtime, but insist on 25 cents per hour minimum for journeymen, with $1.50 per day for helpers of the first grade, and $1 per day for helpers of the second class.

According to local papers some 200 workmen laid down their tools, while a member of one of the contracting firms states that only four electrical workmen went out on Monday, and that a meeting held by the strikers that afternoon was attended by 10 men, the four workmen and half a dozen hangers-on who have been out of work for the last three or four months.

It is claimed by the strikers that the grand secretary of the National Brotherhood of Electrical Workers at St. Louis has telegraphed the Milwaukee union, indorsing the stand it takes and promising financial aid.

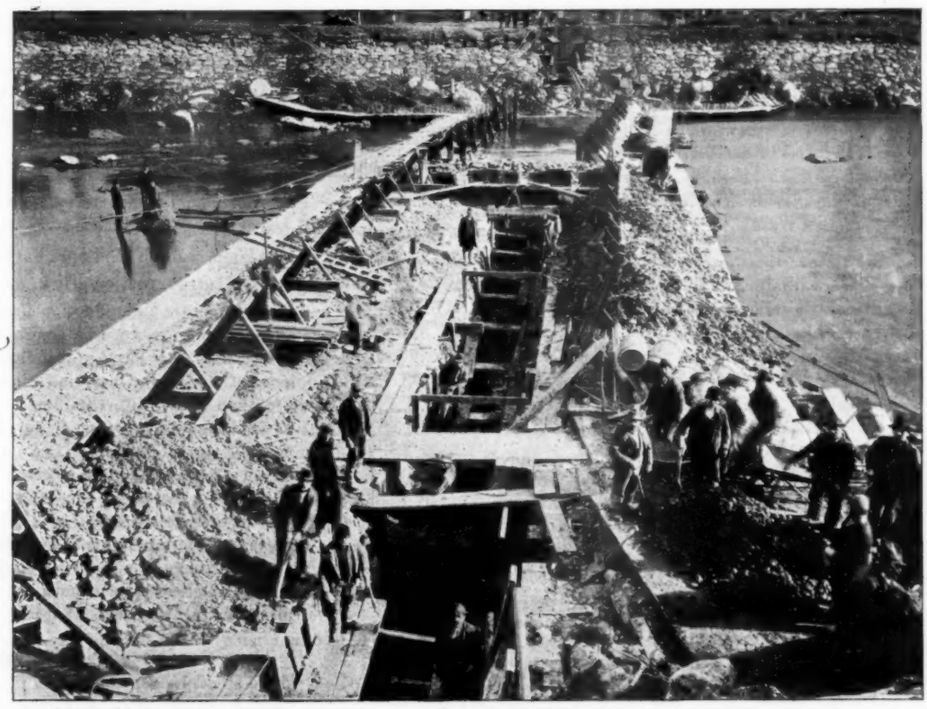

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FIG. 3.—BUILDING THE TUNNEL AND LAYING CONDUITS ACROSS LACHINE CANAL.—Construction by the National Conduit and Cable Company, New York.

The New Orleans, La., Traction Company reports for April: Gross earnings, $103,990, decrease, $5,226; operating expenses, $66,810, increase, $7,615; net earnings, $37,180, decrease, $12,841. From January 1: Gross earnings, $421,675, decrease, $20,791; operating expenses, $273,129, increase, $32,062; net earnings, $148,546, decrease, $52,853.

## Fort Wayne Lamp Company.

As mentioned in the ELECTRICAL REVIEW for May 19, 1897, the organization of the Fort Wayne Lamp Company, of Cleveland, Ohio, has been carried out. Plans are now being prepared, and will soon be completed, by which the company will be enabled to place on the market in large quantities, a high-grade, up-to-date incandescent lamp.

The company has secured the plant until recently occupied by the Adams-Bagnall Electric Company, the latter having removed their business to the Steel Motor Company's building in Cleveland.

Mr. L. H. Rogers has resigned his position as general manager of the Adams-Bagnall Electric Company, and has accepted a similar position with the Fort Wayne Lamp Company. The Adams-Bagnall Company will continue to make arc lamps, as heretofore.

## Annual Meeting of Railway Telegraph Superintendents.

The annual meeting of the Railway Telegraph Superintendents is to be held at Niagara Falls on June 16, 1897. Some very interesting papers are to be read, and a large attendance is promised, and the usual successful meeting is assured.

The officers of the association are:

President, Geo. M. Dugan, superintendent, Illinois Central Railroad, Chicago.

Vice-president, J. W. Lattig, Lehigh Valley Railroad, South Bethlehem, Pa.

Secretary and treasurer, P. W. Drew, Wisconsin Central Railroad, Milwaukee, Wis.

Every preparation has been made to insure the comfort and enjoyment of attending members and their families, and a most enjoyable time is anticipated.

# Electrical Review

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**NEW YORK, JUNE 2, 1897.**


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The specifications, drawings and claims of the two Berliner telephone patents are presented in this issue in full. They make interesting reading for telephone people.

### *A CONVENTION CITY.*

Niagara Falls is very fortunate this year in having secured four electrical conventions. The natural beauty of the surroundings has always made it a desirable place, and now that it has taken the lead in electrical development it has become doubly so—especially to any one interested in electricity. There are ample hotel accommodations within convenient distance from all the various attractions, and the former existing drawback—namely, lack of a convention hall—has been overcome this Spring. The old armory of the Forty-second Separate Company has been bought and is being turned into a commodious hall. By means of an addition on one side of the main building, ample floor space will be given for such exhibits as may be presented. The main hall will seat about 1,500 people, and in addition to this there will be a smaller room upstairs—seating about 300—where committee meetings may be held. The hall is located within a very short distance of the hotels and business part of the town, and may be conveniently reached by the street cars. The National Electric Light Association, which will convene on June 8, 9 and 10, will meet in the ball-room of the International Hotel.

### *IMPROVE THE LAMPS.*

Deterioration is the fate of all mechanism, and we suppose the statement may be made of all devices which are transformers of energy, whatever be their type. But we would like, in some cases, to see the deterioration reduced to smaller figures. One such case is the incandescent lamp. Much good work has been done, it is true, particularly in modes of manufacture and reduction of cost, and some progress can be asserted as to efficiency; but has the incandescent lamp of to-day any materially longer life than it had 10 years ago? We mean life at a good efficiency and normal candle-power. If a lamp which starts at 16-candle-power could be made to maintain it for 1,000 or 1,500 hours' actual use, it would be a great boon both to lighting companies and their customers. It is a subject worthy of some patient work by our most skillful inventors.

The carbon makers deserve a good share of credit for their part in the onward march of arc lighting. Reduction of resistance, better quality and texture and extreme care in all the departments of manufacture have had their effect, and to-day the average arc light carbon is as far ahead of its prototype of 1880 as the constant-current, high-potential dynamo is in advance of the crude machines of that era. The carbon men have recognized the necessity of meeting requirements, and they have more than done their part.

### *THE ELECTRIC HORSELESS CARRIAGE HERE.*

The many trials of this modern contrivance, which undeniably prove that a horseless carriage can be built, have produced an intense degree of activity among inventors and manufacturers. Already a number of establishments have been equipped for the regular output of the new luxury, as it may as yet be termed. Already the vehicles in various forms are in daily practical use.

A careful review of the work so far done—and it has been great—points to the adoption of the storage battery with its accompanying electric motor as being by far the best adapted to the requirements. Apart from the perfect ease of manipulation, the electric carriage possesses the great merits of being clean, free from smoke, steam, hot gases and reciprocating parts. The motion is smooth and uniform, which is virtually impossible with any known type of engine motor. No special skill is required in taking care of the electric carriage.

The makers of storage batteries have met the question squarely with their 600-pound batteries, and we may expect to have a four-wheel vehicle weighing complete not over 2,000 pounds when ready for service. When we consider that the ordinary four-wheeler with two horses weighs far more than this and occupies twice the room on the roadway, we can appreciate some of the results on our crowded thoroughfares from the point of view of pavement wear and convenience of travel. Applied to both passenger vehicles and freight trucks, it means that with the general adoption of the new motor our streets will be only half as crowded as they are, and the aggravating clatter of hoofs will be eliminated with all the attendant olfactory evils of cab and truck stands and nervous beasts.

Runaways and their dangers will no longer alarm the people, crossings will be respected more, and pedestrians will have some chance of safety and serenity.

All this, we predict, will come to pass, and the forerunners are now to be seen; and the vehicle will be electrical, as no other system will inspire the confidence of the people. The great electrical development of the last quarter of the century will record a fitting triumph in the horseless vehicle in its long list of victories over the most stalwart agencies of the past in lighting, power transmission, manufacturing economics and locomotion.

The long-burning, inclosed-arc type of lamp is obtaining a strong foothold nowadays. It has its special uses, and often proves about the best thing to fit the circumstances in which it is to be placed.

## PERSONAL.

Mr. P. C. Burns, of the American Electric Telephone Company, is hustling through Ohio and Indiana, having recently visited Ashtabula and South Bend.

Mr. E. A. Leslie, general manager of the Manhattan Electric Light Company, New York, will sail for Europe next month, to enjoy a rest of several weeks.

Mr. A. C. White, general manager of the Providence Telephone Company, has been elected chief marshal of the Fourth of July ceremonies in his city. An old-fashioned celebration is contemplated, and Mr. White will see that it is a complete success.

Dr. W. M. Habirshaw, the head and front of the India Rubber and Gutta Percha Insulating Company, returned last week after a brief vacation of about 60 days in foreign countries. Dr. Habirshaw enjoyed this respite from dull care and returns in fine health and spirits.

The following-named out-of-town visitors registered at the headquarters of the National Electric Light Association last week: J. W. Wilson, Sheffield, England; E. L. Babcock, Cuyahoga Falls, Ohio; E. B. Douglass, Allentown, Pa.; W. N. Stewart, London, England; W. F. Bossert, Utica, N. Y.; H. T. Edgar, Atlanta, Ga.

Mr. William H. Baker, vice-president of the Postal Telegraph-Cable Company, has just been made also general manager of that great corporation. Mr. Baker is only 42 years old, but has demonstrated the possession of great administrative powers and is well equipped for the onerous duties of managership, having come up through all the stages of promotion in various telegraph companies, and has also had valuable experience in electric manufacturing.

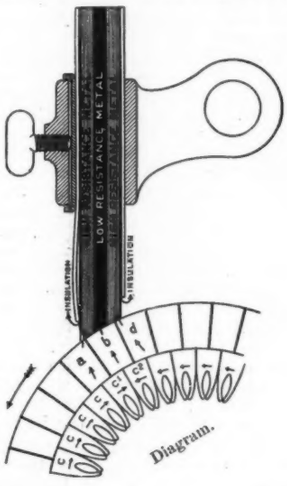
## Lecture on X Rays.

A most interesting lecture on the X rays was delivered by Mr. Chas. G. Burton, of the Central Electric Company, before the Western Society of Engineers, Chicago, at the rooms of the Technical Club, on the evening of May 27 last. The meeting was unusually well attended, quite a number of ladies being present, proving interested and appreciative listeners. Mr. Burton handled the subject in a masterly and fascinating manner, evincing a thorough familiarity with all its details. After giving a history of Roentgen's discovery, from its first inception to the present, Mr. Burton gave a detailed description of the apparatus used to-day, explaining the method of using the apparatus for various purposes. After the lecture proper, a series of lantern slides, prepared by Mr. Burton for the occasion, was exhibited, showing various anatomical subjects. Slides showing the application of the X rays in the mechanical arts were also shown. One of Queen & Company's latest type X-ray outfits was exhibited and was favorably commented on by all familiar with the subject. The apparatus will produce a 12-inch spark and is arranged to be connected directly to any 110-volt, direct-current circuit.

## Western Electric Non-Sparking Brushes.

On dynamos where metal brushes are required to be used, it is often found necessary to use some means of overcoming any excessive sparking, due either to inherent defects in the machine, or to some other cause not readily removed except by using a better designed generator. The non-sparking brush, recently placed on the market by the Western Electric Company, is designed to prevent sparking at the edge of the brush when leaving the segments, and is constructed with high resistance metal placed upon both sides of a low resistance.

The principle on which these brushes work is shown in the cut. The armature coils are represented




diagrammatically at *c c c*, and the brush is shown just before it leaves one of the commutator segments. It will be seen from an inspection of the cut that the current traveling up on either side of the armature, and passing into the brush from the segments *a* and *d*, has to pass through the high resistance metal of the brush, while the current can pass through the coils $c^1$ and $c^2$ into the segment *b*, and from there into the low resistance metal of the brush. Of course, under these conditions, the main body of the current goes through the low resistance metal, and as the segment *a* approaches nearer and nearer the tip of the brush the resistance still further increases, and the amount of current flowing from segment *a* into the brush is gradually diminished until, just as the brush leaves the segment, there is very little, if any, current to be interrupted, and consequently little or no sparking.

This action takes place whether the brush is in its proper position for the load it is carrying or not, the action in the latter case being to reduce the amount of current which has to be broken when the segment leaves the tip of the brush, and, consequently, when sparking does occur, it is not as violent as if the ordinary low resistance brush was used.

An insulating medium is placed between the high resistance metal and the stiffening springs on the outside of the brushes, which prevents the current from reaching the brush-holder without first passing through the entire length of the brush.

## Great Interest in the Electric Light Convention.

To the Editor of Electrical Review:

Mr. Stillwell's lecture, before the National Electric Light Association, will be delivered in the Park Pavilion on the evening of Wednesday, June 9, instead of at the Lyceum Theater, as heretofore announced. The pavilion is located in the park of the New York State reservation, and is near both the International Hotel and the Cataract House.

From the amount of correspondence being received at this office from central station managers, a most unusual interest is being taken all over the country in the meeting of the association. Several new members were added to both active and associate lists during the past week, and numerous inquiries are being answered daily, regarding qualifications for membership and usefulness of the association. The representation from central stations will undoubtedly be larger at the Niagara meeting than at any convention of recent years, and the number of associate members will be fully up to the usual standard.

Yours very truly,
Geo. F. Porter,
Secretary.

New York, May 29.

## Electric Power for Drilling Oil Wells.

Again the electric current holds out a helping hand to our industries, this time stepping boldly into the oil and gas fields. At present the practice is to use a portable steam boiler, supplying steam to a horizontal engine furnishing power to the drill and sand pump. After a number of wells become "producers," one boiler is safely located and steam is piped thence to the various engines for pumping, and these steam lines are dreadful wastes of steam.

According to reports from Pittsburgh all this is to be changed now. The Elcho Oil Company is about to introduce electricity as power for the operation of drills, pumps, etc., at their wells in Washington County. They are already erecting a plant for pumping by electricity. By the proposed method only five men will be required, instead of the large number heretofore employed.

The introduction of electricity in connection with oil operations in the fields was first started by the John J. Carter Oil Company, at Titusville, but the new power was not employed in drilling. The Elcho company will be the first to experiment in this direction. It has figured that in the saving of running expenses it can pay for the electric plant in 18 months. The only trouble experienced in this connection is in supplanting steam used to heat the oil so that it will be accepted by the pipe lines when under grade. The company thinks it has figured out this problem successfully by using a coil of high resistance in its tanks. It is claimed that this coil will furnish sufficient heat to separate the oil and bring up the grade, so that the pipe lines will accept it.

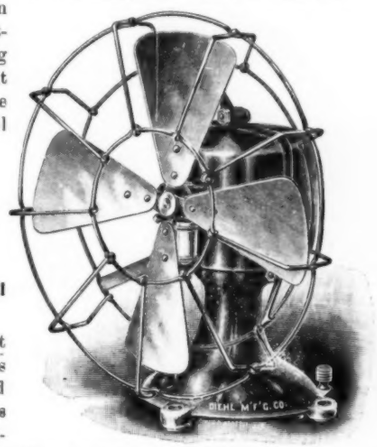
We venture to predict a practical success, and the opening of a new and wide field for electric distribution of power.

## New Diehl Desk Fan.

In connection with the complete series of ceiling fans and ventilating apparatus of which the Diehl Manufacturing Company are large manufacturers, this company has recently perfected a desk fan which embodies several features likely to bring it into general use in competition with those now being made.

The 12-inch pattern at 110 voltage consumes from 30 to 35 amperes with 1,800 revolutions. This is, perhaps, the highest efficiency yet reached in the construction of small motors for this service, and, from the point of view of the central station manager, is the important element for consideration.

The motor is constructed on the principle of an unbroken magnetic circuit—that is, using one continuous piece with only a joint on the outside. The bearings are all self-oiling and




New Diehl High-Efficiency Electric Fan Motor.

self-aligning. Carbon brushes are used. The armatures are insulated with double silk and all wires on the fan are concealed. Each fan has a Carpenter enamel, three-speed regulator, made especially for this motor.

The finish is a highly polished black enamel with gold ornamentation and the apparatus is very compact and symmetrical in appearance.

The large shops of the Diehl Manufacturing Company at Elizabethport, N. J., are in a most active condition in view of the season's output of ceiling fans, and this industry in a few years has become one of the most important in electrical manufacturing.

## American Association for the Advancement of Science.

The preliminary programme of the proceedings of the Detroit meeting of the American Association for the Advancement of Science is to be issued by each of the sections before the middle of June. It is expected that the programme for Section B (physics) will include a number of electrical papers of especial interest, as it is becoming more and more customary for electricians to attend this meeting. Brief abstracts of papers to be presented before this section should be forwarded to its secretary, Dr. Frederick Bedell, Ithaca, N. Y., at the earliest possible date.

## THE DIRECT CONVERSION OF HEAT INTO ELECTRICITY.

ADDRESS DELIVERED BEFORE THE NEW YORK ELECTRICAL SOCIETY, THURSDAY, MAY 20, 1897, BY H. BARRINGER COX.

It may interest you, perhaps, to know how I came to take up the subject of thermo-electricity. Thermo-electricity is a much tabooed, much maligned and much misunderstood subject. People think that immediately one takes up the problem of thermo-electricity that it is not exactly a guarantee of the healthy condition of one's mind. I have been studying the subject for a great many years, and I do not know but that it has affected me. I think it will interest you to know that I took up the subject from reading a newspaper clipping when I was but a young boy. I saw the clipping, I think, in *Harper's Weekly* or *Bazaar*. The clipping was this: "There are three great inventions to come—the first is the direct conversion of heat into electricity, the second is a light without heat, and the third a successful flying machine."

I concluded that the greatest of these problems was the direct conversion of heat into electricity, and immediately I took up the work with the courage and confidence of youth, little dreaming of the years of hard work before me.

It may amuse you to know what means I first tried, with the view of producing the result which I desired. I will illustrate to you on this blackboard the way in which I tried to produce electricity, by what we know as thermo-electricity, or the thermo-electric effect. In other words, electricity directly from heat by thermo-electric action. First, I went to the Cincinnati Public Library and got a text-book on electricity, and read it very carefully, and, from the deductions which I made from the statements of the text-book regarding the subject, I concluded it was simply a question of bringing two metals together somewhere or somehow, and if heat was applied to the two metals someway or somehow, that the effect desired would be produced. I concluded to make a machine and try it—that if nobody else had succeeded in producing such a machine, that, of necessity, I certainly could; there being no doubt about that. I started with the firm conviction I could do it and was going to do it. The idea that came into my mind was to have two dissimilar metals so that they did not touch and yet apply heat to them. I then got up a machine in this way (Illustrating). Here are two disks of metal, and here is a piece of insulation between. My conception was that I wanted as fine a piece of insulation as I could get. Here was another disk of metal that was insulated from the others. Then I put another piece of metal with another insulating disk below. Then the fourth piece of metal was insulated in a similar way, and so on, building up my pile, until I had quite a lot of disks. I had a strong conviction that the chief idea in thermo-electric work was to use dissimilar metals, and apply heat properly, and then we had the problem solved. I made up my mind not to get metals that some one knew about, because in that event my prospective patents might be defeated—so I very carefully instructed one man to make one metal disk, and went to another man and got him to make the other one. After I got the pile arranged all right, built up as shown, up through the center of it I placed the heating device, which was an ordinary argand lamp burner, that was to heat the metals. My conception of the problem was simply to have two dissimilar metals some way or other heated—so, after I had my argand burner, with the pile surrounding it, I carefully took off a wire from there and here (illustrating), and then looked for results. Now, if there had been any attainable results from the thing, I never would have found it with the device I had to indicate the current. I had been led to believe that all you needed to indicate electrical energy was a compass with a wire running underneath it, in which there flowed an electrical current. So I took an ordinary compass and ran a wire underneath it, and with my pile in circuit I carefully watched for the deflection. I did not find it then and I would not expect to find it now with such a combination of devices. [Laughter.] I had carefully insured against every possibility of effect; it was impossible to get any. That was my start in direct conversion; and, I think, you will agree with me that it was enough to discourage even a youth.

Following that time I was called to Europe, and while there I continued to study the subject of thermo-electricity, and I looked into the practical facts and details of what had been accomplished, and then came to something like a sensible conclusion in regard to it. In the first place, I concluded that thermo-electric action was due to the junction of two dissimilar metals, or action in a single metal in which there was a rupture of some kind. For instance, if we take an iron wire and tie it into a knot or bend it, and apply heat at the knotted or bent point, we get the thermo-electric effect. I then concluded that thermo-electric effect was entirely different from the problem which I had undertaken—that is, the direct conversion of heat into electrical energy. I did not believe in the singleness of the problem—that is, if I succeeded in producing a thermo-electric couple which had a high efficiency in the way of voltage and high efficiency in the way of amperage, that that was not the whole problem. I believe that there was another and very important problem, and that was the amount of heat required, and how much would the complete device cost? Cost of make, cost of fuel and cost of attendance, and finally the length of life it would have in ordinary work. How long will it last, and how much will it cost to purchase and operate, or the question of cost from the practical standpoint, the same as we consider cost in our every day, work-a-day practical devices; that is, after all, the true objective point of most inventions.

As to the efficiency of thermo-electric couples, it is usually stated in the text-books that the electro-motive force of antimony and bismuth is so much, of antimony and platinum so much, and iron and copper so much, but you will seldom, if ever, see a statement made as to the amperage output of the couple. The ampere is the real practical side of the thing, aside from the electro-motive force. In my investigations I have paid very little attention to thermo electric couples from the standpoint of their electro-motive force. My chief attention has been paid to this—that thermo-electric couples were deficient, not so much in their electro-motive force, but in their mechanical construction; in the fact of their disintegration, in the fact of their general worthlessness, but I did not believe that there was a possibility of producing thermo-electric elements which would of themselves unquestionably solve the problem. The real question beyond the couple was the question of heat and of the mechanical construction and cheapness of cost of the device. Suppose the question of price should be ignored, and you were simply shown something which produced an electro-motive force of, we will say, 25 volts, which is quite within the bounds of possibilities to produce in a device of the size and gas consumption of the one before you. The question you as practical men would ask is—How much does the device cost, how long does it run, and what does it cost to operate?

There is a considerable difference between thermo-electricity and the direct conversion of heat. I could interest you, I suppose, far more by thermo-electric illustrations than I could by any possible illustrations of direct conversion as shown by these generators. The ones I have to show you to-night, you must remember, are simple, demonstrated commercial facts, and not theoretical possibilities. In taking up the subject of direct conversion of heat, I first looked into the subject from the point of view of the mechanical difficulties that were in the thermo-electric couple. This is what I found, and it was quite alarming to find such difficulties in one problem, conceding it to be a simple problem. I found first, if you joined two metals together that there was a great liability to oxidation of the joint. How would oxidation affect the output of the machine? The ampere current which you obtained this minute would be less the next minute, and become less and less gradually, until practically there was no ampere output whatever. Secondly, conceding the fact that we had overcome the oxidation of the joint, was there any other difficulty? Yes, there was, and a very serious one—about as serious as was the difficulty of oxidation; that is the serious difficulty of the disintegration of the element, its breaking apart or disruption; in this difficulty you have an element which would be all right and apparently strong to-day, and it would, owing to defective structure, rupture or break apart without warning. No practical machine could be made with any such couple as that. Another point about the couples was this, conceding that both these difficulties could be corrected there was still another very serious difficulty in the couple, and that was the fact that they were so fragile that, taking a couple of three-quarters of an inch in thickness, you could take it in your fingers and crush it almost to powder; it was totally impracticable from a commercial point, for it was impossible to use any such delicate thing.

I finally started with a view of overcoming these three difficulties; first, the oxidation of the joint; second, the disintegration of the element, and third, its extremely fragile nature. I think it will be well if you will concede the fact for a few minutes that I have overcome the defects, so that I may describe how I produce the couples right from the raw metal, clear up to their use in the completed devices which you see before you—just how the work is done, and every detail, as I remember the details now. Then we can see as to how far I have succeeded in producing a practical working thermo-electric device, to what extent have I been able to produce a successful one. I am very sorry that I have not some thermo-electric couples here to-night. I ordered them by cable from England, and they have arrived here and are going through the custom house, but any one familiar with the customs knows that a long delay in delivery is considered necessary.

However, I found in my gripsack to-day three couples. Any one after this talk is over is welcome to look at them, and try them, and see whether they are fragile or easily broken, particularly as they are only one-quarter of an inch in thickness. They are made of two parts antimony and one of zinc, which is Seebeck's old metal which he used back in 1821. I have always recognized Professor Seebeck as the father of thermo-electricity. The cross-connection piece is made of copper. I have no necessity for concealing the metals used, for it is simply in my treatment of the metals which makes them tough, easily handled, and not liable to rupture, and useful as practical couples. But to get to the subject of the couple; for that is the real starting point of the device. We make them now by machinery. There is no soldering or brazing or joining, except a machine joint. The castings are made in a special room, the room being heated up to a considerable temperature, and it is quite disagreeable to stop in the room. All the work is done under as high a heat as it is possible for the men to stand. The cross-connection parts are dropped into the machine mould, and the couples are made quicker than it would be possible for me to walk from here to the door; not only one, but 15 are made in that time. It is impossible to count five, I suppose, before the casting is made complete in all its joints, and we are now, or will be in a very short time, running a machine which will make a casting, which goes from the bottom of this device clear to its top, with absolutely no joint in the entire device. In making this casting, it is not a jointing of this cross strip with his lug, as we term it in shop parlance, but it is a shading of one thing into the other. Just as if we take a heavy bar here, and a light bar here (indicating), there is a distinct connection; but if we shade this down here (indicating) and again bring it down here, there is really no line of demarkation, no line where there is a joint. Perhaps it would be best to consider this as having been spread out to take a heavy line here, and an entirely different line there, there is the line of demarkation. We do away with that line, and shade it off from one into the other, gradually shade from one line to the other, so that there is no line of demarkation; if there was a line of demarkation, there could always be a possibility of oxidation, separation or disintegration. If there is no line of demarkation, it is impossible even to imagine where there might be the possibility of rupture.

In thermo-electric couples the fact has been conceded that, if we had a couple like this (indicating), the closer we could get to the surface the higher the electro-motive force. I do not find it so. Instead of putting our junction there, we turn this cross-connection piece (indicating) down into the element, that way, and turn the opposite piece up, that way, which, you can see, would very materially tend towards lowering the internal resistance of this lug; and we find no decrease in the electrical output from the standpoint of the electro-motive force. This is contrary to the way thermo-electric elements have been made.

*(To be continued.)*

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The extent of the business of the Bell telephone companies is shown in the following extract from the American Bell Telephone Company's last annual report: "The companies operating under our licenses expended during the year $8,275,929.11 for new construction, to which amount is to be added an expenditure of $1,160,-924.30 for land and buildings." This makes the round sum of over $9,400,-000 expended in improvements in 12 months. What a great thing this "talking machine" has grown to be!

# TELEPHONE NEWS AND COMMENT.

The Erie Telegraph and Telephone Company has closed contract for 1,000,000 pounds of copper wire.

The Telephone Manufacturing Company, of Baltimore, Md., will establish a 75,000 branch factory somewhere in that neighborhood. A site is not yet selected.

The Home Telephone Company seems to be making some headway in Pittsburgh, preparations being well underway for quite a large exchange there.

It is rumored that the Best Telephone Company, whose works are now at Baltimore, is contemplating removal of its whole plant to some point at or near Pittsburgh, Pa.

The annual meeting of the Erie Telegraph and Telephone Company will be held June 8 in New York. Books closed May 8 and will open June 9. Mr. C. J. Glidden, vice-president, is the active head of this successful company.

A chattel mortgage has been filed with the County Recorder, of Cleveland, Ohio, by the Home Telephone Company in favor of the Cleveland Trust Company for $500,000. The mortgage was given to secure an issue of 1,000 bonds at $500 each.

At a meeting of the directors of the Michigan Telephone Company, of Detroit, Mich., the following officers were elected: F. A. Forbes, president; Robert T. Lincoln, of Chicago, vice-president; Hugh McMillan, treasurer; Herbert M. Field, secretary.

The output of instruments of the American Bell Company for the month ended May 20: Gross, 20,598, increase, 597; returned, 8,452, increase, 915; net, 12,146, decrease, 318. From December 1 to May 20: Gross, 94,333, decrease, 2,186; returned, 36,608, increase, 609; net, 57,725, decrease, 2,795; total outstanding, 830,014; increase, 94,518.

Mr. Geo. W. Beers, of the Fort Wayne Telephone Company, entertained a number of visiting telephone men at the Fort Wayne Club last week. The meeting was for the purpose of discussing the telephone situation, and was addressed by Judge R. S. Taylor. A number of State associations were represented and several committees appointed.

Roanoke, Va., is at present undergoing a telephone rate war. The Southern Bell Company have had control of the business there for a number of years, charging the people $40 and $30, respectively, for business houses and residences. The citizens went to work and formed an independent company, which was absorbed by the Interstate Telegraph and Telephone Company, of Durham, N. C. This concern reduced the prices to $30 and $20, and secured over 200 subscribers on a five years' contract. The new company has been at work for six weeks erecting poles and stringing wires.

At Mobile, Ala., the other evening, subscribers of the Home Telephone Company had an unexpected treat. The Mexican band, whose reputation is world-wide, was giving a concert at the theater. The Home Telephone Company had previously arranged a transmitter in a good position, and run a circuit to the switchboard at the telephone exchange. When the concert began subscribers were called, their lines connected, and they were able to hear and enjoy the musical programme at their homes and places of business. The concert was also reproduced at Waynesboro, Miss., 125 miles away, over the long-distance instruments. This is a use to which the telephone may be put more and more in the future. Another Mobile invention is the "'phone party," in which a number of subscribers are all connected in one circuit, and can fire away as if all in one room.

It is interesting to note that the semi-centennial historian of the Congregational Church at Ann Arbor, Mich., has placed upon the minutes of honor a biographical note of Prof. Amos E. Dolbear, the distinguished scientist, inventor and writer. The Professor went to Michigan University in 1867, a friendless orphan from Ohio, in moderate financial circumstances, to work out an advanced course; played the organ in church at a dollar a Sunday, instructed a class in music, and became assistant in the chemical laboratory. He stayed two years and went to Kentucky, and taught school one year, and two years in West Virginia, and landed in 1874 as professor of physics and astronomy, where he remained. The Professor is the inventor of valuable improvements in the original Bell telephone, which paid him well; also a train telegraphing system, an instrument for telegraphing maps, and other important ideas. The Professor has been and is truly a shining light, and the University has reason to be proud of one who, if not a son, can be claimed as a first cousin.

## DEVELOPMENT OF THE "LYNN" PROCESS OF RENEWING LAMPS.

### NEW FACTORY OF THE LYNN INCANDESCENT LAMP COMPANY AT LYNN.

The success of renewing incandescent lamps reached in the last year has become an important element in the electric lamp industry. This work, up to the present time, has been almost wholly carried on by the Lynn Incandescent Lamp Company, of Lynn, Mass., according to the theories and methods of Mr. E. F. Dwyer, the president, which are the results of many years of study and experiment while Mr. Dwyer was in the shops of the General Electric Company at Lynn and afterwards. At the time of the organization this company started in a small way, hoping to demonstrate the practicability of the method, and for a time met with discouragements because of scepticism born of many failures in this direction. The process developed well and the business has grown, until recently the Lynn Incandescent Lamp Company moved into a large building with a complete equipment for handling 10,000 lamps daily.

FIG. 1.—"DEVELOPMENT OF THE LYNN PROCESS OF RENEWING LAMPS."

The first feature in the process of renewing the burned-out lamps is that when a shipment of old lamps is received a test is made to ascertain the condition of the vacuum of each lamp. The bulbs which have not retained the vacuum are rejected, as it is an indication that the lamp is faulty in construction with a leak somewhere, and only those which have a perfect vacuum are put through the process. This fact alone tends to show that the total life of a given number of lamps which have been through the "Lynn" process is greater than when in leaving a factory new.

The lamps are then sorted into varying sizes to enable them to be fitted with a shape and length of filament, which will give them a good appearance. For the purpose of withdrawing the old filament and inserting the new, the tip of the lamp is taken off without disturbing the collar, and the opening is enlarged to the size of a lead pencil, and through that opening the old is withdrawn and new inserted. The new filament is then cemented into position by a cement which is really the key to the whole operation and makes the renewal possible. This cement is very strong and is a good conductor, withstanding a high temperature without throwing off the gas which renders most paste joints objectionable. The bamboo filament used in the renewal is of unusually high specific resistance, requiring a heavy treatment to bring it to the proper voltage. This insures great durability and uniformity.

The Sprangler form of pump is used as the lamps are exhausted individually, and the important feature of every lamp is a high vacuum.

The renewed lamps are next singly measured on a photometer and then lighted on a testing rack and carefully inspected to discover defects. It is the aim to make these lamps, after having undergone this process, superior to their original condition because of the high-grade filament and perfect vacuum, and at a saving to the consumer of nearly half the incandescent lamp expenses.

FIG. 2.—TESTING LAMPS AFTER THE "LYNN" RENEWAL PROCESS.

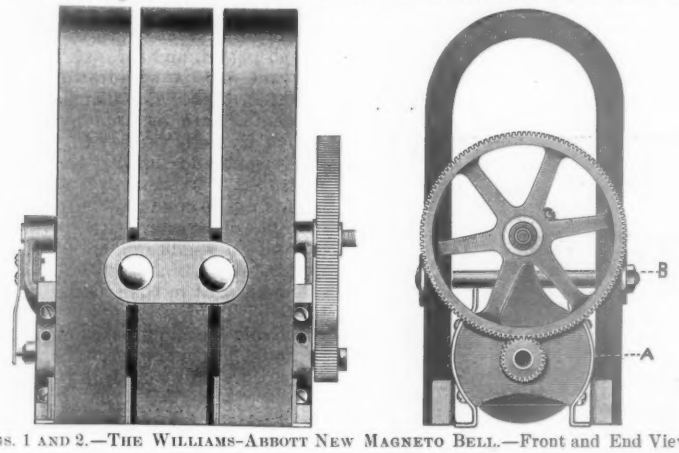
## The New President of the A. I. E. E.

The election of Prof. F. B. Crocker to the presidency of the American Institute of Electrical Engineers, is but a fitting testimonial to a gentleman who, brilliant in his professional career, has been untiring in his efforts to promote the practical side of the electrical business. Born in 1861, graduated from Columbia School of Mines in 1882, he was well equipped for the good work he has done as an inventor and designer of all sorts of electrical machinery and apparatus; as a prolific writer on electrical subjects; as one of the founders of the prosperous Crocker-Wheeler Electric Company, of Ampere, N. J., and later as the professor of electric engineering at Columbia, his *alma mater*, which chair he still fills with great ability and success. President Crocker will be an honor and credit to the society, and we congratulate both him and it upon his election.

## The Williams-Abbott New Telephone Magneto Bell.

A new and modern magneto bell is being manufactured by the Williams-Abbott Electric Company, of Cleveland, Ohio. This company makes an exclusive business of the manufacture of magneto bells for telephone work. They present the one illustrated with a pride and knowledge that it represents their latest and most modern practice in telephone engineering.

Fig. 1 is a front view of the generator. The magnets stand six inches high and are three and one-quarter inches wide over all, and are made of the highest grade of magnet steel that can be procured, made especially from their own formula. Heavy cast cut gears, five-sixteenths of an inch face, and epicycloidal teeth combine long life and quiet running. The bearings are cast on to the end pieces and are of a special mixture of bronze. They are very long and very rigid, to insure quiet running, substantial construction and long life. The oil holes are located conveniently on the front of the machine. This generator is fitted with an automatic shunt, which is located on the crank shaft. The brush used to carry the current from the armature is of spring phosphor bronze, to prevent its corrosion and loss of tension. The fibre blocks used to secure the brush in position are boiled in paraffine to render their insulating quality perfect.



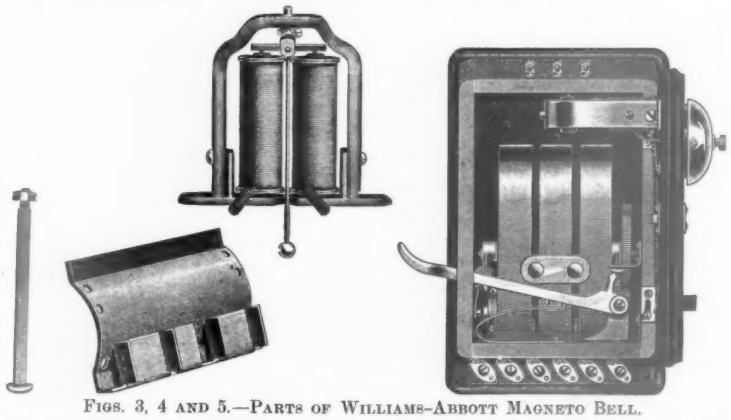

FIGS. 1 AND 2.—THE WILLIAMS-ABBOTT NEW MAGNETO BELL.—Front and End View.

Fig. 2 is an end view of the generator, showing the construction of the pole pieces. One special point of superiority announced for this generator is that it utilizes about 20 per cent more magnetism than in the older forms, by taking the magnetic contact of the pole piece and permanent magnet at or about a line horizontally bisecting the armature circle, and taking its point of contact from the point "A," in Fig. 2, to the extremity of the magnet and pole piece, whereas on the older forms of magnetos the pole piece extends up to about the position "E," Fig. 2, and gets its contact from there down.

Fig. 3 illustrates the form of pole piece used, showing the seats or channels for the magnets to rest in. By the use of the flattened bolts, it is rendered possible to use wider magnets without reducing the strength of the bolts binding them together, so as to entirely cover the polar surface of the armature with permanent magnets.

The diameter of the armature on this machine is one and seven-eighths of an inch, as against one and one-half inches on the ordinary types of magneto bells, permitting this machine to be wound with very heavy wire, and at the same time get length of wire sufficient to get high voltage. The manufacturers claim that this machine has a capacity of 40 watts, as against 10 watts in the ordinary type of magneto bells.

Their standard, 10,000-ohm magneto generator has 125 volts, with about four times the current output of the ordinary type of magneto. This feature is a great advantage on exchange work, where there is a great deal of leakage on the lines from the tree tops, and poor insulation, as it stands to reason that the machine with the heaviest output in current will take care of the leakage, and at the same time have sufficient current left to operate the switchboard drop, or the other bells on the line.



FIGS. 3, 4 AND 5.—PARTS OF WILLIAMS-ABBOTT MAGNETO BELL.

This company also manufactures four grades of bridging bells, A, B, C and D. The mechanical construction of them is identical with their standard exchange bells, illustrated in Fig. 5. The resistance of the ringers on their lowest grade A, is 1,000 ohms; grade B, is 2,500 ohms; grade C, is 3,000 ohms; and grade D, the highest grade, has a resistance of 5,000 ohms on the ringer, which is coupled with a very high inductance, permitting the use of a great number of bells on the line, without detrimentally effecting the talking qualities of the circuit. The ringer used on all of the bells of this company's make is their tri-polar ringer, shown in Fig. 4. All of the parts of the new bell are made interchangeable, and can be easily replaced from time to time, at a slight expense, as repairs render it necessary. In introducing the feature of interchangeable parts in magneto bell construction, this company has taken the initiative step, and one that will be well appreciated. All bells guaranteed not to infringe.

## THE BERLINER PATENTS.

PRESENTED IN FULL WITH ILLUSTRATIONS—THE "REVIEW'S" COMMENTS THREE YEARS AGO—JUDGE CARPENTER'S REMARKS—A VERY INTERESTING PATENT SITUATION.

Since the Supreme Court rendered its decision on the Berliner patents, in which it abstained from any reference to the question of validity on the merits, the daily and technical journals have been flooded with all sorts of opinions on the question. For the benefit of the numerous readers of the ELECTRICAL REVIEW we reproduce herewith, first, an extract from our editorial of April 4, 1894, second, an extract from the decision of Judge Carpenter, of the United States Circuit Court, rendered December 18, 1894, and, finally, the two Berliner patents *ipsissima verba*, for comparison. The Court of Appeals, it will be remembered, in this same case on appeal, decided to confine the inquiry to the charge of fraud, and did not pass an opinion on the merits of the patent. The United States Supreme Court agreed with this, claiming that the other questions were not properly before it, in the following words:

"We agree with the Court of Appeals that it is unnecessary to determine whether there are two separate inventions in the transmitter and the receiver, or whether the patent of 1891 is for an invention which was covered by the patent of 1880. The judgment of the Patent Office, the tribunal established by Congress to determine such questions, was adverse to the contention of the government, and such judgment can not be reviewed in this suit."

The meaning, in practical effect, is that some lower court must first be invoked to pass upon the novelty of the invention in an ordinary action for infringement before it can be taken up by the Supreme Court on appeal from such lower court.

The following is an extract from the ELECTRICAL REVIEW editorial of April 4, 1894:

"But a very interesting question arises in the Berliner patent by reason of a decision of the Supreme Court of the United States in Miller, *et al*, vs. Eagle Manufacturing Company, decided January 8 of this year, and which was referred to in a recent article in the ELECTRICAL REVIEW above noted, which contains the following syllabus:

The result of the authorities on this point of law is that no later patent can be issued for an invention actually covered by an earlier patent, especially to the same patentee, although the terms of the claims in the patents may differ and the later patent may contain the broader claims, unless it distinctly appears that the invention covered by the later patent was a separate invention, distinctly different and independent from that covered by the first patent. It must contain something more than a mere distinction of the breadth or scope of the claims.

Now, inasmuch as Berliner patented a telephone November 2, 1880—No. 233,969—showing and describing exactly the same apparatus as is shown and described in the above-quoted patent, but in which a claim both for the apparatus as a receiver and for the system of transmission were claimed, it would seem that the later patent would be void."

The following is an extract from Judge Carpenter's decision in the Berliner case, December 18, 1894, after quoting the fourth claim of the patent as given below:

4. A system of two or more telephone instruments in electrical connection with each other, each consisting of two or more poles of an electrical circuit in contact one with the other, either or both poles of each instrument being connected with a vibratory plate, so that any vibration which is made at one contact is reproduced at the other, substantially as set forth.

"This patent is, therefore, for the 'system' or combination of a transmitter, and a receiver for a speaking telephone. The whole apparatus is shown in the drawings of both patents and is identically the same in both. The transmitter and the receiver are identical in form, and differ in function according as they are placed at the transmitting or at the receiving end of the telephone wire. It, therefore, appears that one of the functions of the device shown in the patent for 1880, namely, the function of transmitting articulate speech, is identical with the sole object or function of the device covered by the patent of 1891, and that the device for effecting the transmission is identical in both patents. The patent, therefore, seems to me to be void and beyond the power of the commissioner to issue (Miller vs. Eagle Manufacturing Company, 151 United States, 186)."

It will be noted that the drawings of the invention in the two patents are alike in all particulars; but this of itself is a common practice where an original application is later subdivided. In fact, often it is compulsory to have the drawing in the divisional case exactly the same as that of the original application. In the present case the two drawings are reproduced merely to complete our record.

Barring simple differences in verbiage and modes of expression, such as would inevitably result when two writers refer to the same subject. the specifications are alike in describing the same *device;* the only difference being that in the claims of one patent the *device* is called a "transmitter" and a "receiver" in the other. There is one feature, however, worthy of note. In both patents Figs. 1 and 2 are lettered exactly alike, connections are the same, and there is nothing to indicate which is the transmitter and which the receiver. As a matter of fact, according to the description, each would be both, *and would have to be so* in the 1880 patent in order to justify the fourth claim for a system.

In the 1891 patent, too, no distinction is made showing any difference in the two instruments described. "*Transmitting sound along a line of an electric current,*" as italicized in the preamble to the specification, necessarily means the use of a transmitter and a receiver. "*By placing, now, one such instrument in the station, etc.,*" evidently has the same meaning. But, as the two instruments are identical, we may take either. In his description of the figures in this patent, Berliner goes on to say: "Fig. 5, a view of the diaphragms arranged to receive and transmit the sound waves." A similar anomalous condition exists in the description in the 1880 patent.

It is, however, useless to discuss this question here, or, for that matter, anywhere except in the court room, as nothing but the dictum from the bench can be decisive. Our readers have both patents fully before them and can form their own opinions.

In this issue we merely comment on the peculiar and anomalous fact that both patents describe the same *device,* the differences patented being only the names and functions of transmission and reception. We do not know of a parallel case in the entire history of patents.

We publish below, in full, both Berliner patents, omitting only the reference in the 1891 patent to a

recording apparatus, which has no bearing on the question:

BERLINER PATENT, NO. 233,969, ISSUED NOVEMBER 2, 1880.

My invention consists in a new and useful improvement in telephonic receivers for producing sound by means of varying electrical currents, of which the following is a specification.

It is a fact and a scientific principle that if two electrodes be placed in contact to form part of a circuit and a current of electricity be passed through them a repulsion is exerted between them. Based on this fact, I have constructed a simple receiver for an electric telephone apparatus.

In Fig. 2 of the drawings, A is a metal plate well fastened to the wooden box or frame but able to vibrate. Against the plate and touching it is the metal ball *c*, terminating the rod B, which rests on the bar or stand *d* and presses against the plate which pressure, however, can be regulated by the thumb-screw attached to the ball.

If a current of electricity passes through the plate and the point of contact, or vice versa, a repulsive movement will take place between the plate and the ball, because both are charged with the same kind of electricity. This force of repulsion may be weakened or strengthened by varying the strength of the current. As that strength is varied by any appropriate form of electric speaking telephone transmitter (especially that shown at A B of the various figures of the drawings, and more particularly described and claimed by me in another application filed June 4, 1877 of which this is a division), so will also the force of repulsion at the point in the receiver be alternately weakened and strengthened as many times accordingly, and will therefore cause its plate to vibrate at the same rate and measure. The latter vibrations being communicated to the surrounding air, the same kind of sound as uttered against the transmitter, Fig. 1, will be reproduced at the receiver, Fig. 2, or in as many other receiving instruments as are situated within the same electric circuit.

In Fig. 2 I have shown the receiver as consisting of a diaphragm in contact with a ball. In Figs. 3 and 4 I show it as somewhat differently mounted, and with the contact piece in the form of a pin instead of a ball, and in Fig. 6 in a still different form with a carbon contact. In this figure, W is a piece of carbon.

In Fig. 5 two plates in contact at their edges are shown.

In the drawings, the letter A represents a diaphragm or plate, preferably of thin metal of limited conductive capacity, such as iron, steel, German silver, platinum, and also carbon secured in the frame *m m* in the box *f* in any convenient manner.

The letter *y* represents a ring resting against one side of said diaphragm, and capable of being made to bear upon the same with more or less force by means of set-screws *n*, in order that the tension of the diaphragm may be regulated.

The letter B represents a screw or piece of metal or carbon, pointed at one end and mounted in a cross-piece *d* in such position that the point will be in contact with the diaphragm A. The diaphragm A is connected with one pole of a battery by means of a wire, and the pin or screw B with the other pole.

Fig. 4 shows the manner in which the complete apparatus, consisting of the transmitter A B and the receiver A B, is connected up in circuit.

It will be observed that the transmitter is of the same construction as the receiver. When a sound is uttered in the neighborhood of the transmitter its plate will vibrate accordingly, and the pressure between the plate and the pin or ball at the point of contact *a* will become weaker or stronger, according to the vibrations, and this variation of pressure will cause the current passing to become weaker or stronger, and thus effect the changes which operate the receiver, as already described.

As shown in Fig. 3, the box *f* is provided with a tube K to which the ear of the operator may be applied in order to hear the sounds produced by the vibratory diaphragm when the instrument is employed as a receiver, and a tube O through which he can speak when employing the instrument as a transmitter, so that the operator is not in need of moving the instrument or moving his head while carrying on a conversation. This combination, with the sound chamber of a telephone provided with the usual sound passage or mouthpiece, of an additional sound-conveyor or hearing-tube forms, however, no part of the invention.

I claim:

1. The herein-described method of producing sound vibrations in a plate by causing a varying electric current to pass to the plate, or to an electrode connected therewith, from a second electrode in contact therewith, substantially as described.

2. An apparatus for producing sound by means of a varying electric current, which consists of a plate forming or carrying an electrode placed in contact with another electrode, from one to the other of which the electric current is caused to pass.

3. An electric telephone receiver to be operated by varying electric currents, and consisting of two contact pieces within an electric circuit, one or both of which pieces consist of or are connected with a vibratory diaphragm, whereby one electric current passing through said circuit exercises a repulsion between said two electrodes corresponding to its strength, and thus produces corresponding motions in the diaphragm.

4. A system of two or more telephone instruments in electrical connection with each other, each consisting of two or more poles of an electrical circuit in contact, one with the other, either or both poles of each instrument being connected with a vibratory plate, so that any vibration which is made at one contact is reproduced at the other, substantially as set forth.

In testimony whereof, I have signed this specification in the presence of two subscribing witnesses.

Witnesses: EMILE BERLINER.
C. H. GREAVES.
ALFRED J. MAYO.

BERLINER PATENT, NUMBER 463,569, ISSUED NOVEMBER 17, 1891.

My invention consists in a new and useful improvement in transmitters for electrically transmitting sound of any kind, of which the following is a specification.

It is a fact that if, at a point of contact between two conductors forming part of an electric circuit and carrying an electric current, the pressure between both sides of the contact becomes weakened the current passing becomes less intense—as, for instance, if an operator on a Morse instrument does not press down the key with a certain firmness the sounder at the receiving instrument works much weaker than if the full pressure of the hand had been used. Based on this fact I have constructed a simple apparatus for transmitting sound *along a line of an electric current* in the following manner.

In Figs. 1 and 2 of the drawings, A is a metal plate well fastened to the wooden box or frame, but able to vibrate if sound is uttered against it or in the neighborhood of said plate. Against the plate and touching it is the metal ball C, terminating the screw-threaded rod B, which is supported by the bar or stand *d*. The pressure of the ball C against the plate A can be regulated by turning the rod B. The said ball and plate are included in circuit with an electric battery, so that they form electrodes, the current passing from one of them to the other. By making the plate vibrate the pressure at the point of contact *a* becomes weaker or stronger as often as vibrations occur, and

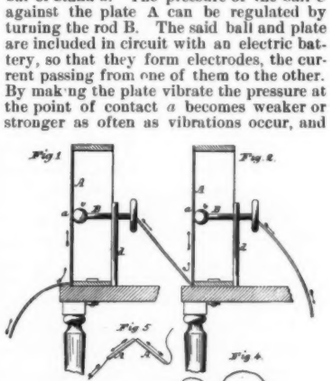


FIG. 1.—PATENT DRAWINGS WITH BERLINER PATENT, ISSUED NOV. 2, 1880. —Reduced fac-simile.

the strength of the current is thereby varied accordingly, as already described. *By placing now*, as is shown in the drawings, *one such instrument* in the station Fig. 1, and another instrument capable of acting as a telephonic receiver in the station Fig. 2, both situated on the same electric circuit in which a current is passing (as shown by the wire connections following the arrows), sound uttered against the plate of the instrument Fig. 1 will be reproduced by the plate of the instrument Fig. 2, for as the vibrations of the transmitter Fig. 1 caused by the sound will alternately weaken and strengthen the current as many times as vibrations occur, the diaphragm of the receiver will be caused by these electrical variations to vibrate at the same rate and measure. The latter vibrations being communicated to the surrounding air, the same kind of sound as uttered against the transmitter Fig. 1, will be reproduced at the receiver Fig. 2, or in as many other receiving instruments as are situated within the same electric circuit.

It is not essential that the plate should be of metal. It can be of any material able to vibrate, if only at the point of contact suitable arrangement is made so that the current passes through that point. The plate may be of any shape or size, or other suitable vibratory media may be used—a wire, for example. Any other metallic point, surface, wire, etc., may be substituted for the ball. There may be more than one point of contact to be affected by the same vibrations. Both of the electrodes may vibrate, although it is preferable that only one should. If the uttered sound is so strong that its vibrations will cause a breaking of the current at the point of contact in the transmitter, then the result at the receiving instrument will be a tone much louder, but not as distinct in regard to articulation.

I have also embodied my invention in and used it in connection with some other forms of apparatus.

In the drawings, Fig. 4 represents a detached view of the vibratory diaphragm, showing its relative situation to the poles of the galvanic current; Fig. 3 represents a view of a complete apparatus; Fig. 5 *a view of the diaphragms arranged to receive and transmit the sound waves;* and 6, 7 and 8 modifications of the vibratory diaphragm.

In the drawings, the letter A represents a diaphragm or plate of thin metal, of limited conductive capacity, such as iron, steel, German silver, platinum, secured in the frame *m m* in the box F in any convenient manner.

The letter *y* represents a ring resting against one side of said diaphragm and capable of being made to bear upon the same with more or less force by means of set-screws *n*, in order that the tension of the diaphragm may be regulated.

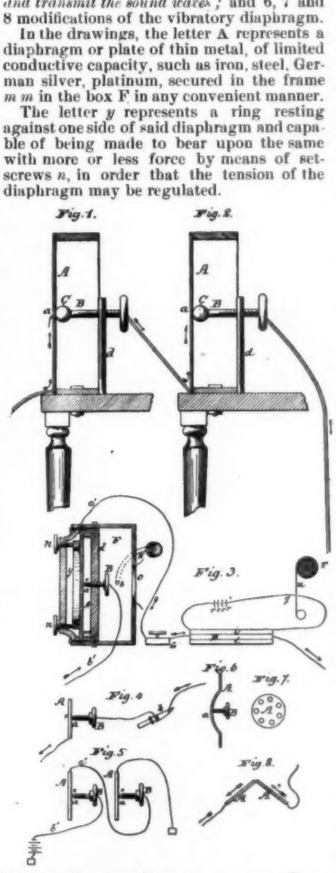


FIG. 2.—PATENT DRAWINGS WITH BERLINER PATENT, ISSUED NOV. 17, 1891. —Reduced fac-simile.

The letter B represents a screw or pin of metal, pointed at one end and mounted in a cross-piece *d* in such position that the point will be in contact with the diaphragm A. The diaphragm A is connected with one pole of a battery by means of a wire *a'*, and the pin or screw B with the other pole by means of a wire *b'*.

The box F, of Fig. 3, is provided with a tube K, to which the ear of the operator may be applied, in order to hear the sounds produced by the vibratory diaphragm when the instrument is employed as a receiver, and a tube O through which he can speak when employing the instrument as a transmitter, so that the operator is not in need of moving the instrument or moving his head while carrying on a conversation.

Instead of employing a single vibratory plate, as shown in Figs. 1, 2, 3, 4 and 5, in each instrument, two such plates may be employed, as illustrated in Fig. 8, said diaphragms being connected to the respective poles and in contact with each other at their edges, as shown in Fig. 8.

The diaphragm of my improved receiver, or the diaphragm of any magneto receiver (such as those described by Alexander Graham Bell, in his patent, No. 174,465, of March 7, 1876, and in his patent, No. 186,787, of January 30, 1877), will receive a particularly strong shock at the setting in and sudden cessation of the current, when a ticking sound will be heard from the plate; but a weakening of the current alone can also be observed most distinctly and accurately by making, for example, a connection within the same circuit by a wire and the blade of a knife *k*, Fig. 4. When scraping the wire end over the blade of the knife, this scraping is distinctly audible on the plate. Here the current is never entirely interrupted, yet the minute elevations and cavities on the blade, caused by the structure of the steel and which again cause minute alterations in the intensity of the current, are sufficient to shake or vibrate the plate with varying intensity, thus rendering again the same peculiar scraping noise. If, now, the plate of one instrument, as in Figs. 1 or 5, is vibrated by sound waves (which happens whenever any kind of sound is uttered or is produced by musical instruments in its neighborhood), every wave or vibration that strikes the plate produces between the two sides of the contact a variation of pressure, which causes a variation of resistance at that point, and therefore a variation in the strength of the passing current, and if the sound is sufficiently strong, it will break the circuit at said point of contact, the variations in the current thus produced causing similar vibrations in the plate of the receiving instrument. The essential part of the apparatus is the point of contact, which must offer a resistance to the current.

It is not necessary in the transmitting apparatus that the plate should be of conducting material, for any substance capable of vibration will answer, if only at the point of contact provision is made for the current to pass. It is sometimes convenient to use a vibrating plate in the form of a reflector, as shown in Fig. 6, for concentrating the sound, or the diaphragm may be provided with a number of apertures to disperse the sound, as shown in Fig. 7. These apertures prove advantageous with strong sounds, particularly the hissing sounds, as while the sound waves are rushing toward the diaphragm, those touching the plate are repelled and partially destroy the following waves, just as sea waves when forced against a cliff will be thrown back, destroying those directly behind. The holes permit most of the waves to pass to the other side of the plate, making the vibration of the plate more perfect and even.

It will be observed that in Figs. 1 and 2, one of the electrodes presents a convex curvilinear surface, like a rounded knob. This possesses some advantages, among which are ease of construction and durability, because it does not wear away the opposing electrode as much as a sharp one would, and when the contact with the vibrating body is made of such a form, the freedom of the vibration is less interfered with.

I do not claim that I am the first inventor of the art of transmitting vocal and other sounds telegraphically by causing electrical undulations similar in form to the sound waves accompanying said sound. Neither do I claim that I am the first who caused such electrical undulations, by varying the resistance of an electric circuit in which a current was passing.

I do not herein claim the novel form of vibratory-plate receiver which I have described, because that is a subject of claim in another application.

I claim:

1. The method of producing in a circuit electrical undulations similar in form to sound waves by causing the sound waves to vary the pressure between electrodes in constant contact so as to strengthen and weaken the contact and thereby increase and diminish the resistance of the circuit, substantially as described.

2. An electric speaking telephone transmitter operated by sound waves and consisting of a plate sensitive to said sound waves, electrodes in constant contact with each other, and forming part of a circuit which includes a battery or other source of electric energy and adapted to increase and decrease the resistance of the electric circuit by the variation in pressure between them caused by the vibrational movement of said sensitive plate.

3. The combination, with the diaphragm and vibratory electrode, of a rigidly-held opposing electrode in constant contact with the vibratory electrode, substantially as described.

4. In a telephonic transmitter, a vibrational plate made concave for condensing the sound, substantially as set forth.

5. In a telephonic transmitter, a vibrational plate, provided with one or more apertures, as and for the purposes set forth.

6. A speaking-telephone transmitter comprising a diaphragm or disk sensitive to sound waves, combined with a rigidly held, but adjustable electrode in contact with the same, whereby the electric current is transformed into a series of undulations corresponding with the vibrations of said diaphragm.

In testimony that I claim the foregoing I have hereunto set my hand in the presence of the subscribing witnesses.

EMILE BERLINER.

Witnesses:
J. A. RUTHERFORD,
JAMES L. NORRIS.

### ELECTRIC LIGHT FLASHES.

A franchise for an electric lighting plant for Bangkok has been granted to an American firm by the King of Siam.

The Central Electric Company, of Lexington, Ky., is building an additional power-house for dynamos to be used in lighting the city. A 30,000,000 gallon reservoir is being built. The cost of these improvements it is reported will be about $35,000.

### Vacuum Tube Lighting.

At Newark, N. J., one evening last week, Mr. D. McFarlan Moore, at the headquarters of the Moore Electrical Company, gave an exhibition of results obtained by him since last year in vacuum tube lighting, to a limited number of invited guests, consisting of representatives of some daily papers, scientific journals, and others interested in the general subject of lighting.

Mr. Edward J. Wessels, president of the company, made an address to the guests, explaining some of the features to which he wished to call attention. The light was produced from a number of vacuum tubes strung around the room near the ceiling, occupying about the place of the usual picture moulding.

Mr. Wessels announced that the "vibrator" of a year ago had been replaced by a rotary device, called the "rotator;" that Mr. Moore had succeeded in operating the vacuum tubes in multiple arc; that one rotator and coils transform the current for all tubes of an installation; that the amount of power required had been likewise reduced, and that the quality of the light had been much improved by raising the rate of vibration from 6,000 up to about 50,000 per minute.

Mr. Moore gave a series of experiments with his tubes, aside from the lighting of the room, and before dispersing the guests were photographed by the light from the vacuum tubes. Mr. Moore explained that the results shown would have been much better but for an untimely break-down somewhere in the power-house supplying the current he used, which necessitated the hurried substitution of another circuit which was not so well suited to his purpose; but, rather than disappoint his audience, he had made the best of it.

### A Monster Microphonograph.

A large Dussand microphonograph, now being constructed for the Paris exhibition of 1900, is expected to make the voice heard by 10,000 people. This form of apparatus is especially designed for the deaf, and for the study of the feeble sounds given out by the organs of the body in health and disease. It magnifies the voice much as a lens magnifies objects to the eye. The register is a modified phonograph, with a diaphragm vibrated by small electro magnets, receiving currents through a microphone; the repeater is somewhat similar, with a microphone attached to the membrane, the current for this being obtained from one to sixty battery cells and thence passing to a telephone. The intensity depends upon the amount of current passing. The instrument is being used in the education of deaf mutes, and has had a marked effect in stimulating the nerves and apparatus of hearing.

### Edison Manufacturing Company's Motors and Outfits.

The Edison Manufacturing Company are seasonably prominent with their battery fan-motor outfits, cuts of which we illustrate herewith.

The Ironclad outfit carries a seven-inch fan, and is provided with a guard. The batteries operating this motor consist of three Edison-Lalande cells, type "S," and the motor runs at about 1,200 revolutions per minute on this battery. As the motor is a very efficient one, the battery will run the fan for 150 hours before needing to be recharged.

The nine-inch Edison fan-motor outfit, made by the same company, has been very greatly improved this season. The motor is very much more efficient, and now runs the fan at about 900 revolutions per minute, on a little more than two amperes of current when using the battery supplied with this outfit, which consists of four Edison-Lalande cells, type "S," in polished oak box. The greatest attention has been paid to the elimination of all unnecessary friction in the moving parts, and it is provided with self-oiling bearings and the workmanship is of the highest grade.

This company has made a new departure this year in bringing out a nine-inch fan motor, to run on the 110 to 120 volt direct current, and which we illustrate herewith. This motor is similar in construction to the nine-inch Edison battery fan motor, but is wound for the electric light circuit, and will run right across the line. It is provided with three speeds, and will run 1,400, 1,700 and 2,100 revolutions per minute respectively. It is of very high efficiency, the watts used at these three speeds being only 36, 48 and 60 watts, respectively. The same high workmanship which characterizes all the apparatus manufactured by this company is observable in the construction of this motor.

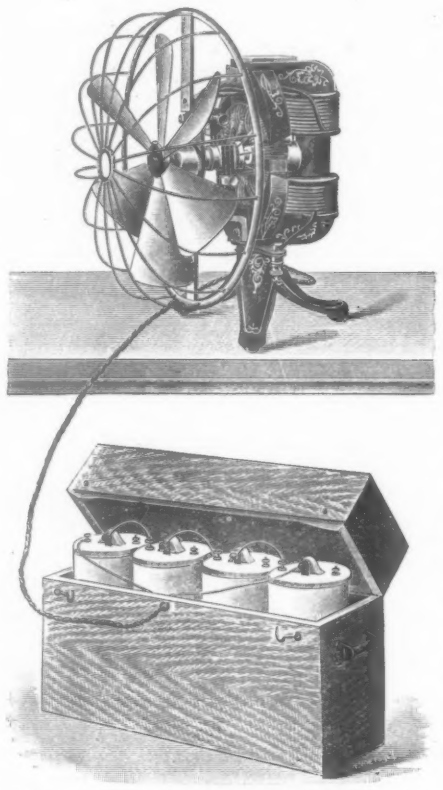


FIG. 1.—EDISON MANUFACTURING COMPANY'S 9-INCH FAN, MOTOR AND BATTERY.

They have a full line of samples at their New York office, 110 East Twenty-third street, New York, and they can fill all orders without any delay from their factory at Orange, N. J.

FIG. 3.—EDISON MANUFACTURING COMPANY'S 7-INCH FAN, MOTOR AND BATTERY.

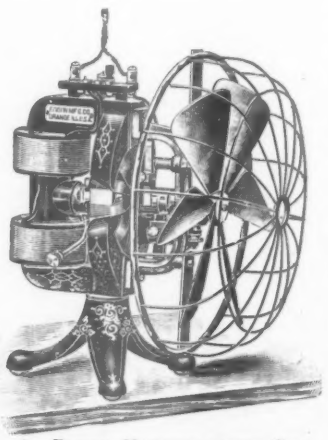


FIG. 2.—EDISON MANUFACTURING COMPANY'S 110-VOLT FAN MOTOR.

Another dispute about wages and working time is threatened by the employés of the Brooklyn Heights Street Railway Company. It takes the form of an agreement drawn by the employés, under the name of the Empire Protective Association, to be presented to President Rossiter for action. Much of the dispute seems, as usual, to rest on the old "tripper" question.

### The Electrical Engineers' Meeting at Greenacre, Me.

With regard to the proposed meeting of the American Institute of Electrical Engineers at Greenacre, Me., the following details will be of interest:

In 1894 Miss Sarah J. Farmer, daughter of the late Moses G. Farmer, the well known pioneer in electrical discovery and invention, established at Greenacre, Eliot, Me., a unique and interesting movement for the education and elevation of the people. It was not a "Summer school" in the ordinary acceptation of the term, but a place where all the advantages of Summer rest and recreation of a rational character could be combined with rare opportunities for the development of the higher nature. The leading idea of the Greenacre lectures was peace and unity, to be sought through the presentation and comparison of the constructive phases of progressive thought in every field of study and investigation. The platform was broadly ethical and purely humanitarian.

During the last week in July it is Miss Farmer's purpose to commemorate the fiftieth anniversary of her father's earliest work in the electrical field, involving the application of electricity to motor traction, which has now become such an indispensable factor in the life of our great cities, and in solving the problem of suburban communication. The lectures of the conference during this week will commemorate different phases of progress in electrical science, and there will be an exhibition during July of interesting material illustrating the earliest attempts at motor traction by means of electricity, and the subsequent evolution of this method of transportation. We understand that Miss Farmer has been assured of the co-operation of the Patent Office at Washington in obtaining material for this exhibit, from which a few early models will be taken. The loan collection will, in the main, be a graphic one. Any person possessing models, drawings, or any portable material bearing upon this subject, and willing to permit its use in this exhibition, will confer a great favor upon Miss Farmer by communicating with her as early as possible, at Greenacre, Eliot, Me.

The American Institute of Electrical Engineers, of which her father was an honorary member—the only American, therefore, elected—has decided to join in this interesting commemoration meeting by holding its annual meeting during the week beginning July 26 at Eliot. New cottages and dormitories are in process of erection, which, with the usual accommodations at the Greenacre Inn, and the fine hotels at Portsmouth and Newcastle, easily accessible by rail and carriage or by a steam launch plying on the beautiful Piscataqua, will afford ample accommodations to all who wish to avail themselves of this rare opportunity.

## THE LIMITATIONS OF GOVERNMENT IN WATER-POWER PLANTS.

BY MARK A. REPLOGLE.

The regulation of the speed of a water-wheel in a power plant is determined by four distinct factors:

1. Changes in load or requirements for power.

2. Time required for gravity to generate power.

3. Capacity of the plant for stored energy; and

4. The governor or mechanism that should automatically combine the above three factors in such a manner as to obtain even speed or good regulation. These factors, clearly defined, are bases from which intelligent calculations can be made showing the possible efficiency of government in any water-power plant.

Let it be understood that the word "government" refers to that regularity of motion or speed that is so desirable and necessary in our finest manufacturing and electrical power plants. Absolutely uniform speed can be maintained only when there is no change in the power supply and no change in the friction or work of the plant; but if the above factors are carefully considered and judiciously manipulated or applied, the variations of speed may be so reduced that the results can be called perfect government.

The speed of a plant at all times is a resultant of opposing forces establishing an equilibrium or balance. The power supply has a tendency to increase speed and the work has a tendency to decrease it. Speed may be varied by increasing the power supply or by decreasing the power supply; by increasing the amount of work performed or by decreasing the amount of work performed; and any one of the above changes causes instantly a change in the speed; but the amount of change in speed depends entirely upon the amount of change in load, the time it takes gravity to generate power, the quantity of energy in store and the operation of the governor in opening or closing gate.

Since it is impossible for any automatic governor to change the power supply at the instant a change has been made in the load or work of a power plant, it is very plain that there must be fluctuations in the speed. The problem of government is to narrow these fluctuations to such an extent that the speed will be constant as far as practical operation is concerned. The finest government ever obtained consisted of changes in speed, but within narrow limits. The speed of a well governed single-crank engine changes four times every revolution.

The first factor in governing, "the changes in load," is a variable one, and is limited only by the character of the work done by the water-wheel. The changes may range from zero to the full power of the wheel instantly, making government a more difficult problem than it would be if the changes were limited in number or quantity. It is plain that if an even speed is retained when a change in load is made, there must be at the same instant a corresponding change in the power supply. This is an impossibility in automatic governing, for several reasons: the speed must change in order to inspire the speed governor; following this, the speed governor causes the valve or gate-moving mechanism to operate, which operation requires time; and again, it requires time for gravity to overcome the inertia of the increased quantity of water that must pass through the wheel before an increase in power can be had. During all this time, the speed of plant has been decreasing if the load was increased, or increasing if the load was decreased, and the amount of change in speed depends entirely upon what ratio the change in load bears to the stored energy in the moving parts of the plant. A heavy change in load will, of course, cause a greater change in speed before the power supply is changed, than a light change in load. The problem is, therefore, to proportion properly the power storage to the changes of load that must be imposed upon the plant, because this power storage, or the capacity to store power, must take care of all changes in load until the power supply, or gravity effects, can compensate for said changes.

The second factor, "time required for gravity to generate power," is more constant than the first. In fact, the limits are established in the construction of the water-power plant, and, of course, remain so. The point we wish to emphasize most in the time requirements is the inertia and momentum effects of the water.

A locomotive can propel a train of cars at a rapid speed; but it takes time to acquire such speed. When the locomotive has brought enough pressure to bear upon the train, it moves, at first slowly, but keeps increasing in speed often many seconds before it reaches full motion. The locomotive may be limited in strength to 250 horse-power per second. The train in full motion may represent 25,000 horse-power for a second. In such case, it will take the locomotive 100 seconds to bring the train to speed if we do not consider the frictional losses. Water has no power in itself; but must be put in motion by gravity in the same manner that the locomotive starts the train of cars, and a long train of water, acted upon by a constant gravity effect, is put in motion in the same manner that the train of cars is by the locomotive. It is plain, then, that the time element must be considered in the government of water power. The water wheel can not furnish power until it brings to rest the water to which gravity has given motion, and it can receive no power from the water until the water has sufficient motion for the moving wheel to retard. It is also plain that there must be changes in the flow and velocity of water for every change made in the load of the water wheel; also the change in the flow of water must occur before there can be a change in the power supply.

It is well known that water has practically no elasticity; hence, if inclosed in a long pipe, the whole body must be put in motion at the same time. If the pipe or flume consists of several hundred feet of horizontal length and only a few feet of vertical pipe or "head" which alone gives gravity effects on the wheel, it is a similar proposition to the locomotive and train of cars. It is very evident, then, that long horizontal pipes should be avoided in order to reduce to a minimum the time required to get gravity effects, because the speed of water wheels will keep changing, after a change in load, until the effects from gravity can correct it in the power supply.

Gravity effects at best are very slow as compared with steam, and for this reason a water power is handicapped in the matter of government. The logical conclusion is, that in water powers the water or power supply should all be under the direct action of gravity and move in line with it. This reduces the time necessary to furnish increased or decreased power, to the shortest limit.

*(To be continued.)*

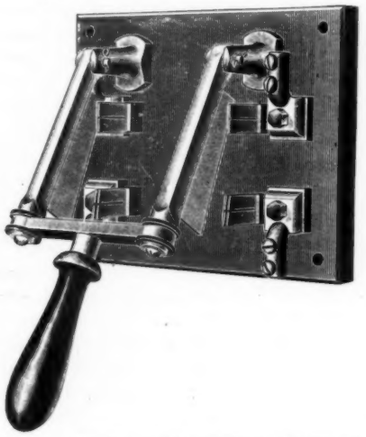


FIG. 1.—FISHER & CRAMPHORN'S STANDARD J. K. SWITCH.

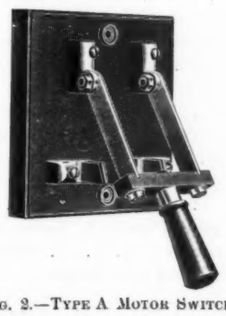


FIG. 2.—TYPE A MOTOR SWITCH.

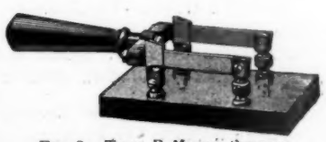


FIG. 3.—TYPE B MOTOR SWITCH.

**Mr. Homer Loring, of Boston, has been appointed receiver of the Saginaw Consolidated Street Railway Company, of Saginaw, Mich., which road is leased to the Union company, of Saginaw. The road is capitalized for $200,000, and has $225,000 of bonds outstanding. The Union company leases the road and guarantees principal and interest on the Consolidated company's bonds, and the petitioners for a receiver claim that it will not be able to pay the interest on these bonds or pay the Consolidated company its proportion of earnings as per the lease. These bonds are now three months in default. The Union company has taken an appeal to the receivership, and case will not come up before the fall court term.**

### Fisher & Cramphorn's Electrical Specialties.

Some illustrations of a few special products of the manufacturers, Fisher & Cramphorn, Congress and A streets, Boston, Mass., are presented on this page. Fig. 1 is their standard high-grade J. K. switch, made with front or back connection, having pure copper blades and contacts. They warrant every switch of this type sent out by them. The Type A motor switch, shown in Fig. 2, is designed for a medium cost switch, and has pure copper blades and contacts. Type B motor switch, shown in Fig. 3, is made to meet the demand for a cheap motor switch.

Fig. 4 illustrates a novelty, being a burglar alarm J. K. switch. It is automatic, and is connected into the lighting circuit in a store, residence, or building. It is controlled by the burglar alarm circuit, and is set for the night with the light switch open. Any burglar tampering with doors or windows, suddenly finds himself and the whole interior of the store or room flooded with light, which naturally puts an end to his operations for the night, as he couldn't get along without using his "bulls-eye." Many of these ingenious devices are in use in Boston.

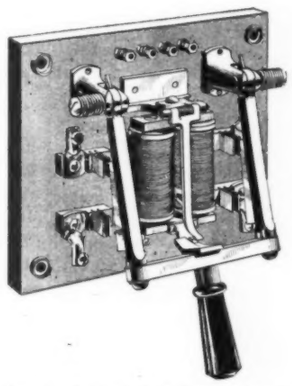


FIG. 4.—AUTOMATIC BURGLAR ALARM LIGHTING SWITCH.

FIG. 5.—LYON BRAKE HANDLE.

The firm also manufactures the well known Lyon brake handle, Fig. 5, which is extensively used by electric railways.

**The Metropolitan Traction earnings in April are said to have exceeded $850,000, representing more than 17,000,000 passengers carried in the month. This was the largest April in the history of the company. The company anticipates from the April returns the largest Spring and Summer business in its history.**

## ADVANCE INFORMATION

### Electric Light and Power.

RICHWOOD, OHIO—Mr. A. A. McGee may be addressed concerning the erection of an electric light plant for this village.

WESTMINSTER, S. C.—Town Clerk may give information concerning establishment of electric light plant.

WATERVILLE, MINN.—City Clerk may give information concerning construction of electric light plant.

ST. ANTHONY PARK, MINN.—An electric light plant will be established at the State Agricultural School.

ONEIDA, N. Y.—Village Clerk may give information concerning lighting of streets with electricity.

ROCHESTER, N. Y.—The Rochester Gas and Electric Company has been awarded contract for lighting the streets with electricity.

MONTGOMERY, ALA.—F. A. Mahan, major engineers, United States Engineer's Office, is in the market for an electric plant to be erected at Pensacola, Fla. He is now inviting bids.

HAVRE DE GRACE, MD. — The Havre de Grace Real Estate and Power Company has been incorporated by A. P. McCombs, W. S. McCombs, Robert K. Vanneman, Stephen J. Seneca and Mrs. Annie E. Seneca; to furnish heat, light and power, etc. Capital stock, $20,000.

JONESBORO, TENN. — The Jonesboro Electric Light Company has been incorporated by R. F. Wells, A. S. Deaderick, R. A. May and others.

DURHAM, N. C. — The Durham Electric Lighting Company's power house slightly damaged by fire.

AUGUSTA, GA. — The Arlington Hotel will put in an electric light and heating plant.

EATONTON, GA.—The Eatonton Electric Company will be organized, to erect a power plant, with a capital stock of $7,000.

WASHINGTON, D. C.—The United States Electric Lighting Company will shortly commence work on its new electric light plant, previously reported. About $300,000 will be expended.

MOUNT AIRY, N. C.—The Mayor may be addressed concerning construction of $25,000 waterworks and electric light plant.

PUEBLO, COLO.—It is reported that an electric light plant is to be established here.

SAN BERNARDINO, CAL. — The Lytle Creek Light and Power Company has been incorporated. The directors are Henry Fischer, H. H. Sinclair, George Eidis, John L. Campbell and James Hutchings. The capital stock subscribed is $300,000. It is proposed to collect the power developed in Lytle Creek and convey it to Los Angeles. Contracts have already been signed for 3,000 horse-power to be furnished by the Southern California Power Company.

POTTSVILLE, PA.—A company has been formed at this place to supply electric lights on the block system.

WOLFBORO, N. H.—An electric light plant is to be established here.

LAWRENCEBURG, KY.—The franchise for the erection of an electric light plant here has been sold to Cashier J. M. Johnson, of the Lawrenceburg Bank.

PALESTINE, TEX.—The Citizens' Light and Power Company has organized with the following well known business men: Henry Ash, A. C. Green, W. P. Savage, Dr. J. H. Grant, Dr. J. M. Colley, A. B. Hodges, C. J. Grainger, G. C. Stevens, and P. W. Ezzell. O. C. Kennedy, general manager. The company has already contracted for poles.

GALVESTON, TEX. — The Brush Electric Light Company will improve its plant at a cost of about $25,000. Contracts have been let for machinery and supplies that will double the plant.

### New Telephone and Telegraph Companies.

NEW YORK, N. Y.—The Electro-Vinual Telegraph Company has been incorporated with a capital stock of $50,000. The directors: Martin C. Ebel, Florence S. Pierson, George L. Mason and Carroll Sprigg, of New York city, and Robert M. G. Walford, of Hackensack, N. J.

WILLMAR, MINN.—A franchise to put in a local system has been granted to Ole Barnstead and John Williams, of this city.

ROCKVILLE, CT. — The Southern New England Telephone Company will extend its line to Ellington as soon as the poles can be set and arrangements can be made.

WARREN, OHIO — The Jefferson, Warren, Kent and Ravenna Telephone companies have established a connection via Mantua, which makes communication now possible all over four counties, Ashtabula, Geauga, Portage and Trumbull, and part of Lake County. New points in the system besides Kent and Ravenna are Garrettsville, Hiram, Shalersville, and Lake Brady.

HAWESVILLE, KY. — A long-distance telephone wire will be laid between this place and Cannelton.

WAYCROSS, GA. — The Southern Telephone Company's system of long-distance lines has been connected with Brunswick.

CONOWAY, W. VA.—The Bell Short-Line Telephone Company has been incorporated by J. N. Lazear and others, with a capital stock of $850.

WILMAR, MINN.—Ole Barnstad and John Williams have been granted a franchise for a local telephone system.

JELLICO, TENN.—Mayor may be addressed concerning construction of telephone line.

CLARKSBURG, W. VA.—The Clarksburg Telephone Company is constructing a double line from Grafton to this place; work has been completed as far as Bridgeport.

WAYCROSS, GA.—Work will commence soon on the Savannah extension of the Southern Telephone and Telegraph Company's line between Jessup and Savannah. Connection has been made between Jessup and Brunswick.

DENVER, COLO.—The Saguache County Telephone Company has been incorporated, with a capital stock of $2,000, by Charles Tarbell, J. Tracy Melvin and C. S. Cornelius, to operate in Saguache County.

ROCK RIVER VALLEY, ILL.—The telephone line is to be extended to Deer Grove.

FRANKLINVILLE, N. Y.—A franchise has been granted to Virgil Hayden for a telephone system.

NACOGDOCHES, TEX.—The Nacogdoches & San Augustine Telephone Company has been incorporated by E. A. Blount, R. C. Shindler, J. M. Weeks, S. W. Blount and G. H. King. Capital stock, $2,000.

MADISON, W. VA.—The Boone & Kanawha Telephone Company has been incorporated by J. R. Atkins, H. Lon Carter, S. M. Croft, J. E. Bradley, F. C. Leftwich and others, to construct and operate telephone lines to connect all of the important towns in Kanawha, Boone, Lincoln, Logan, Raleigh and Wyoming counties.

CASCO, TEX.—The Merchants' Telephone Company has been incorporated by S. P. Butler, John Hokemeyer, Martin I. Filla and others. Capital stock, $1,100.

### New Electric Railways.

WORCESTER, MASS. — A corporation has just been formed, to be known as the Milford, Hopkinton & Westboro Street Railway Company, with a capital stock of $120,000. This Summer an electric road will be built from Milford, through Hopkinton and Woodville, to Westboro, a distance of 12 miles. The stockholders are: Charles L. Claflin, W. H. Baker, J. Allen Rice, L. E. Fales, H. D. Hawker, Hopkinton; C. W. Shippee, Milford; L. Cutler, Westboro; W. B. Ferguson, Malden; L. E. Cooledge, Woodville; Charles A. Richardson, Worcester; N. S. Myrick, Harold E. Fales, George E. Sleeper, G. E. Estes, Arthur E. Childs, George W. Goddard, Boston. The company has elected these directors: Charles L. Claflin, W. B. Ferguson, Charles A. Richardson, N. Sumner Myrick, C. W. Shippee, J. Allen Rice and L. Cutler.

PITTSBURGH, KAN.—The contract has been let for the extension of the electric street railway from this place to Fleming. It is expected that Robert Simons, the owner, will then extend the line another three miles to connect with the Weir City line.

NEW ORLEANS, LA.—The Orleans Street Railway Company, A. Brittin, president, contemplates the extension of its electric system in the suburbs.

SARATOGA, N. Y.—The Saratoga Traction Company has been incorporated, with a capital of $50,000, to construct a street surface road two and one-half miles long from Broadway and Congress street to the Kissingen, Geyser and Vichy Springs. The directors are: Charles G. Farwell, of Boston; L. C. Herckenroth, W. S. Jenks, Alfred B. Thacher and Charles H. Davis, of New York city; Theodore F. Hamilton, of Saratoga Springs; Robert B. Smith, of Hackensack, N. J.; R. S. Storrs, of Orange, N. J., and E. G. Woodling, of Cranford, N. J.

NIAGARA FALLS, N. Y. — The Tonawanda Electric Road has made application for a franchise for a line from here to Grantwick.

### New Manufacturing Companies.

NEW YORK, N. Y.—New York Electro Vapor Motor Company has been incorporated to equip city and suburban railroads and manufacture machinery and appliances. Capital, $100,000; and directors, William H. Goff, of 30 Pulaski street, and T. D. Haskins, of Brooklyn, and C. S. Longstreet, of New York city.

GAINESVILLE, FLA.—The National Insulator Company has been incorporated by J. E. Renault, E. W. Millican, B. F. Dillon and W. W. Hampton, to manufacture insulators for telegraph and telephone companies. Capital stock, $20,000.

### MISCELLANEOUS.

At Elkton, Md., recently "Reform," the winner of the fourth race, was disqualified, and his rider, A. Dorsey, suspended for the balance of the meeting. Dorsey was charged with using an electric battery.

We acknowledge, with thanks, receipt of invitation to attend the national opening of the Philadelphia Museums and the Manufacturers' Club, of Philadelphia, to be held on June 2, 1897, on the occasion of its tenth anniversary, at the Philadelphia Bourse.

The Southern California Electric Company has been organized for the purpose of impounding the waters of the San Gabriel and Santa Ana Rivers, and constructing a large power transmission plant to supply the district. These two streams are about the only rivers in that section which have proved perennial, and united will furnish a very large amount of power. The project is said to have ample capital back of it.

In a recent Chicago case, where a child was killed and damages awarded, Justice Waterman, in dissenting, called attention to a law case of antiquity. Closing the dissenting opinion, the judge fell into the historical mood and wrote: "I may add to the faith of those who believe that there is nothing new to recall that, 23 centuries ago, Lysias, an Athenian orator, presented to an Athenian court the question of responsibility for the accidental death of one who ran within the range of a javelin hurled by the defendant while exercising in a gymnasium."

# Kindred.... ...Interests

**Mr. D. G. McDougall,** Chicago, has recently returned from a business trip through the central western States, looking after the interests of the Washington Carbon Company. Mr. McDougall states that the demand for arc lamp carbons is not as active as desirable on account of the advanced season, but secured several nice orders for motor and generator brushes and other specialties in the carbon line.

**The F. & C. motor switches** make up a new line of goods which the Electric Appliance Company, Chicago, have recently added to their already complete and extensive stock. The F. & C. switches fill the bill for a low-priced motor switch, in capacities of 35 and 65 amperes. The Electric Appliance Company will be pleased to send special prices on these goods on application.

**The Acme Malleable Iron Works,** of Buffalo, N. Y., are erecting an absolutely fireproof building for the storage of their patterns. This building is 30 feet wide and 60 feet long. The building will be constructed of non-combustible material, and the framework will be of steel, the covering of corrugated iron, and the racks supporting the patterns will also be made of metal. The Berlin Iron Bridge Company is furnishing and erecting the steel framework and covering.

**The Central Electric Company,** of Chicago, states that the fan-motor business is opening up with unusual activity. The line of Lundell fan-motor apparatus handled by them has been quite considerably increased this year, and with the addition of the Wagner ceiling fan motor, and the Emerson induction fan motor, they claim to have the most complete line of ventilating apparatus. Their 1897 fan-motor catalogue is an unusually fine representation of the printer's art, and it will be sent to any one interested on application.

**The Ward Leonard Electric Company,** of Hoboken, N. J., sent out the following notice under date of May 25: "We beg to notify you that we are now located in the new factory building at Seventh and Clinton streets, Hoboken, N. J. Telephone 218 B Hoboken, as before. We were fortunate enough to be able to secure, the day after the fire, a factory having a complete electric power plant with electric motors ready to use. We are now running night and day, and can fill promptly all orders for goods which we manufacture."

**McGill & Pomeroy** is the firm name under which Messrs. J. H. McGill and J. G. Pomeroy have recently consolidated their separate interests, with offices in the Monadnock Block, Chicago. They are sales agents for the Ohio Brass Company, the Adams-Bagnall Electric Company, Peru Electric Manufacturing Company, Akron Insulator and Marble Company and A. Mertez Manufacturing Company. They also handle a complete line of electric light, power and railway specialties, and with their wide acquaintance among the trade will undoubtedly secure a proper share of the business.

**The Standard Air-Brake Company,** New York, closed the month of May by securing an additional order from the colonies for 28 complete air-brake outfits for electric motor and trail cars, and another order for additional motor-car air brakes. In view of the fact that their air brakes have been in use in the colonies for nearly three years, this latest order emphasizes the success of the apparatus. The following letter is a strong indorsement recently received by this enterprising company:

AMERICAN LAUNDRY MACHINERY COMPANY.

CLEVELAND, May 21, 1897.

STANDARD AIR-BRAKE COMPANY, NEW YORK N. Y.

DEAR SIRS: Your large catalogue of your air brake has been received and read with pleasure. You have a good arrangement, and will undoubtedly attain the same position in the electric railway field that the Westinghouse Company now holds in the trunk steam railroad estimation.

Your automatic pump controller is excellent, and prevents me from "threshing old hay" as I was working on the same line, but as it has already been accomplished by you there is no need of my simply trying to improve upon it. Wishing you success, I am, Very truly yours,

(Signed) M. S. ROGERS, Superintendent.

**The Berlin Iron Bridge Company, of East Berlin, Ct.,** are working full time, and report that Spring business is opening up in quite a brisk manner. They have a large number of contracts on hand, including a water tower at North Berwick, Me.; large school building at East Albany, N. Y.; steel framework for the Providence Institution for Savings, at Providence, R. I.; steel framework for the new Waterbury Savings Bank, at Waterbury, Ct.; large addition to the Waterbury Farrel Foundry and Machine Company, at Waterbury, Ct.; an addition to the boiler plant of the Bay State Brewery, in South Boston, Mass.; steel trusses for the Opera House, at Corinth, N. Y.; steel work for the new Public Library Building, at Providence, R. I.; an addition to the boiler plant of the Connecticut Hospital for the Insane, at Middletown, Ct.; new pumping station for the York Water Company, at York, Pa.; addition to the boiler plant of the Dunnell Manufacturing Company, at Pawtucket, R. I.; fireproof building for the Guggenheim Smelting Company, at Perth Amboy, N. J.; steel framework for a church at Bartlett, N. H.; besides bridges at Charlemont, Mass.; large steel bridge for Somerset County, N. J.; a steel bridge for the town of Coventry, Ct.; steel highway bridge for the town of Hermon, N. Y.; large city bridge at Vergennes, Vt.; large bridge for the S. D. Warren company, at Cumberland Mills, Me.; also highway bridge at Wilmington, N. Y. It is gratifying in these times to find one concern which is fairly well employed, and this improvement is gradually extending to all industries.

## Chicago Electric Association.

The annual banquet of the Chicago Electric Association was held at the Leland Hotel on the 21st ult., and proved to be a most enjoyable affair. About 40 members and a number of guests were present, who, thanks to the efforts of the arrangements committee, consisting of Messrs. Cravath, Scheible and Hollister, were treated to an evening's enjoyment long to be remembered. Mr. Thomas G. Grier acted as toastmaster in his proverbial happy manner, the toasts given being as follows: "The Absent Ones," by W. Clyde Jones; "Electric Railways of To-day," by G. W. Knox; "Our Next Year's Programme," by Cloyd Marshall; "The Engineering Salesman," by Channing T. Gage; "Telephone Troubles," by Kempster B. Miller, and "Our Association," by S. S. McMeehan. In addition, several impromptu toasts were given, and all were constantly kept in the utmost good humor by such inimitable story tellers as Messrs. Walshe and Mushenheim, of the Western Electric Company, and Mr. M. T. Sullivan.

## LITERARY.

Practical investigators in the efficiency of steam engines and the improvement thereof, should welcome the little book of Prof. Sidney Reeve, of the Worcester Polytechnic Institute, published by the *Progressive Age*, of New York. The book deals with the Entropy-Temperature method of analysis of tests, originated by Prof. Willard Gibbs, of Yale, and contains a curve-chart, well designed, on which concrete results can be quickly plotted and filed for reference and comparison. Every progressive steam engine designer and student should have the book.

For significance, variety and interest of matter, and beauty of illustration, there rarely issues a magazine equal to the June number of *McClure's*. Nobody should fail to read, in this number, the new Kansas story by William Allen White. It is as genuine as life, and is the strongest thing the young Kansas author has yet done. There are other exceptionally good stories in the number, several of them true stories; and they make the number as lively and entertaining as it is instructive.

## KIND WORDS.

COULDN'T GET ALONG WITHOUT IT.

TO THE EDITOR OF ELECTRICAL REVIEW:

Inclosed is post office order for $3. I was trying to make up my mind to stop the subscription, but it was no go. Respectfully yours,

May 19. E. SPRINGER.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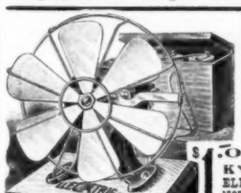


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The increasing popularity of the Gordon Primary Cell among the Fire Alarm and Police Signal Service of the leading cities, the railroad, telegraph and telephone companies, and the general adoption of our steel enameled cell for gas-engine, launch and marine service attest most highly to its merit, efficiency, adaptability and economic features.

If you wish to read the testimonials in its behalf, and learn its full description, kindly apply for circular and price list, to

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NOTHING SO FITS INTO THE PLEASURES OF BICYCLING AS PHOTOGRAPHY.

Pocket Kodaks, Cartridge Kodaks. Bullets and Bulls-Eyes, $5.00 to $25.00.

Especially adapted to the wheelman's use. They use our light-proof Film Cartridges and can be

LOADED IN DAYLIGHT.

"Bicycle Kodaks" booklet free at agencies or by mail.

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EASTMAN KODAK CO.
Rochester, N. Y.

Manufacturers and Dealers PARTRICK & CARTER CO. 125 So. 2nd St. PHILADA. PA. ELECTRICAL HOUSE GOODS.

## ABSTRACTS OF PAPERS READ AT THE HARTFORD MEETING (MAY, 1897) OF THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS.

### "A METHOD OF SHOP ACCOUNTING TO DETERMINE SHOP COST AND MINIMUM SELLING PRICE," BY H. M. LAME, CINCINNATI, OHIO.

Shop cost is the sum of

1. Producer's labor.
2. Cost of material, including freight, hauling and waste.
3. Plant charge.
4. Burden.

The items producer's labor and cost of material require no explanation.

Plant charge is an hourly charge for machine tools independent of, and in addition to, the hourly charge for operator, and covers interest and depreciation on the value of the particular tool and the tool's share of the entire cost of power and power distribution, and in shops using tools varying greatly in size, value, power required and amount of transmitting, machinery involved, will be found to vary from less than one cent to over 40 cents per hour. This hourly tool charge, when once established, is not likely to vary materially and it is listed and used by the cost clerk in the same manner as the hourly rate of a workman.

The "burden" is the sum of all expense chargeable to the shop except producer's labors and material. The total for any given period, divided by the number of producer hours for the same period, gives the hourly burden or the number of cents to be added to each producer hour. These four items give "the cost up to the office door," and to which is added a percentage covering all office expense, including advertising and other costs of selling. This then is the minimum selling price, the price of bare existence without profit, and to which finally a further addition is made, depending upon circumstances for profit. A slight modification, however, is practiced by many; viz., the adding of office expense to shop expense and including it directly in the burden.

In no communication received is any reference made to a merchant's profit on material or merchandise. That this should be recognized and treated as a specific item seems reasonable. Another item not met with is interest on working capital. The large sums tied up in raw material, finished and unfinished work, and deferred payments, justifies a specific charge.

### "THE BEST LOAD FOR THE COMPOUND STEAM ENGINE," BY ALBERT K. MANSFIELD, SALEM, OHIO.

We have records of tests of simple non-condensing engines under different loads, to determine the best point of cut-off of such engines; that is, the point of cut-off corresponding to most economical performance.

In making such tests the results would have greater value if the economy were observed for each of a variety of different loads. By this means the best load for the engine could be ascertained. There can be no doubt that size of engine, speed of engine, per cent of clearance space, method of distributing steam—all have a bearing on this matter; therefore a good many recorded tests need to be made to enable this subject to be well understood.

In the case of the Milwaukee pumping engine, which gave the "record performance" of 11.68 pounds of dry steam, how may it be known from the test that a still better result might not have been obtained with some greater or less load than that of the test?

### "ELECTRICITY VERSUS SHAFTING IN THE MACHINE SHOP," BY CHAS. H. BENJAMIN, CLEVELAND, OHIO.

The author gives the following useful table of comparison:

| Number. | 1 First Cost of Shafting and Belting. | 2 First Cost of Generator and Motors. | 3 Difference in First Cost. | 4 Horse-power Lost by Electric Transmission. | 5 Horse-power Lost by Shafting Transmission. | 6 Net Saving by Electricity: Horse-power. | 7 Saving in Dollars per Year. | 8 Pay Roll per Year (Estimated). |
|---|---|---|---|---|---|---|---|---|
| 1 | ..... | ..... | ..... | 121 | 117 | No gain. | ..... | ..... |
| 2 | 3,650 | 7,150 | + 3,500 | 9 | 49 | 40 | 2,400 | 32,000 |
| 3 | 3,750 | 3,000 | − 750 | 7 | 21 | 14 | 840 | 76,000 |
| 4 | 7,450 | 2,100 | − 5,350 | 6 | 42 | 36 | 2,160 | 40,000 |
| 5 | 7,700 | 7,000 | − 700 | 24 | 53 | 29 | 1,740 | 150,000 |
| 6 | 8,550 | 10,950 | + 2,400 | 39 | 74 | 35 | 2,100 | 112,500 |
| 7 | 2,700 | 4,300 | + 1,600 | 10 | 16 | 6 | 360 | 100,000 |
| 8 | 4,000 | 7,000 | + 3,000 | 17 | 32 | 15 | 900 | 113,000 |
| 9 | 4,000 | 5,000 | + 1,000 | 12 | 20 | 8 | 480 | 50,000 |
| 10 | 9,650 | 18,000 | + 8,350 | 41 | 89 | 48 | 2,880 | 200,000 |
| 11 | 7,550 | 7,000 | − 550 | 16 | 64 | 48 | 2,880 | 175,000 |
| 12 | 8,400 | 25,000 | + 16,600 | 64 | 90 | 26 | 1,560 | 160,000 |

And adds:

Some one may object that these calculations are rough, and based on insufficient data. Even if we admit this, two facts can still be regarded as proven:

1. That the first cost of electrical machinery is usually greater than that of shafting and belting.

2. That the saving in power in most machinery establishments would pay for the additional cost of the electric plant, in from one to five years.

Figures of this kind are about all that we can have to guide us at present. Statements from manufacturers are liable to be influenced by a personal bias, one way or the other; and even where there is an opportunity for a fair comparison, the necessary data are usually lacking. Many cases could be cited, where parties now using electricity claim an actual saving in coal burned of from 15 to 30 per cent.

In most establishments where electricity has been introduced, the transition has only been partial, the generator and motors being burdened with a load of shafting and belts which prevent any saving in power from being effected. It is in new shops constructed with especial reference to electric transmission that we are to look for the best results in efficiency.

It is further to be remembered that the loss of power from shafting and belts is constant as long as the engine is running, whether one machine or a hundred be in operation, while the loss in electric transmission is a per cent of the actual power used, and diminishes as the consumption of current diminishes.

In most cases there are far more important advantages to be considered. Referring to the table, it will be noticed that in Column 8 are given the estimated pay-rolls of the different establishments, allowing $500 per annum for each man employed. A saving of from two to five per cent in the pay-roll is of more importance than any saving that is likely to be effected in the power plant.

The average useful horse-power per man in the heavy machinery establishments before mentioned was 0.38 horse-power, representing $22.80 per year on the usual estimate of $60 per horse-power per year. If the services of the man are set at $500 per year, a low figure, the average cost of power is only four and one-half per cent of the cost of labor.

In the light machinery establishments, the average useful horse-power per man was only 0.195 or $11.70 per year, being only two and one-quarter per cent of the labor cost.

The question of the advantage of introducing electricity hinges not upon efficiency of transmission, but upon the effect on the output of product per man and per machine.

The different points to be considered in determining how electricity affects general economy of production may be classified as follows:

1. General arrangement of machinery to facilitate handling of work.
2. Clear head-room for the use of electric cranes and small hoists.
3. Light and cleanliness.
4. Control of speed.
5. General flexibility of the system.
6. Use of electricity for other purposes than power.

The ordinary machine shop of today, in its shape and size and in the general arrangement of its engines and machinery, is the slave of shafting transmission. The engine must be so located as to connect conveniently with the shafting; all the machines must be arranged in parallel lines, for the same reason; while the ceilings and posts must be designed with special reference to the demands of hangers and brackets. This has been so long the case, that perhaps we hardly realize the possibility of a change.

Machinery should be arranged with reference to the work it is to do, and not with reference to the power to be used; it should be so located on the floor of the shop as to be easily accessible for operation, and in such a way that the work may be readily handled and well lighted. The whole shop should be planned with a view to handling the product with the least waste of time and labor, and electricity makes this possible.

The electric crane is the most convenient and efficient carrier yet developed, and the absence of overhead shafting and belts in electric transmission makes its use possible over all the larger machines. In the Baldwin Locomotive Works the saving has been notable, eight or ten laborers now do work which formerly required 30 to 40 in the wheel shop. Delays in handling formerly lost eight to ten per cent of the time of the skilled help; this is now down to two per cent.

The partial or entire absence of overhead belts will cause an improvement in both quantity and quality of output (owing to better light).

The ease with which the electric system of transmission may be adapted or extended is one of the strongest arguments in its favor. The extravagant consumption of power, as noted in the former paper, is probably due, in most cases, to a gradual extension of the shafting system by lengthening shafts beyond a reasonable limit, to the turning of corners with bevel gears, and to the use of turned and twisted belts, with their attendant evils in the way of guide pulleys.

Shops are usually planned with a view to present needs rather than future possibilities, and extensions are made at some disadvantage; but in the electrical shop this need cause no uneasiness. Whatever the location or the angular position of the new building, the only expense is that of new motors and a few hundred feet of wire.

If the right kind of an electric system be chosen, the same current can be used in a variety of ways which are just beginning to be appreciated. Besides the advantage of having arc and incandescent lamps without any additional expense for generators, the electric current may be used for welding, brazing, soldering, annealing and case-hardening, and each and all of these operations may be affected locally on large machines without moving them from their positions.

*[To be concluded.]*

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# Electrical.... Patents.

[Specially reported for this journal by E. S. Duvall, solicitor of patents, Loan and Trust Building, Washington, D. C. Copies of any patent may be secured for 10 cents each.]

ISSUED MAY 18, 1897.

582,910 Electrical conduit; J. J. Grosbans, Buffalo, N. Y.

582,911 Valve; Will J. Frederick, W. Pittston, Pa.

582,913 Telephoning from cars; M. Garl, Akron, Ohio.

582,936 Electrode; W. Majert, Falkenberg, Germany—Comprises a conducting frame, a soluble coating within said frame, the frame being provided with apertures leading to said coating, and an active mass held within the frame and separated from one surface of the frame by the said coating.

ISSUED MAY 25, 1897.

583,026 System of telegraphy; C. G. Burke, Brooklyn, N. Y.—The method of telegraphing, which consists in transmitting over a line electrical impulses of uniform duration at variable intervals, and indicating or recording at the receiving station the intervals between impulses or the periods of no current on the line.

583,039 Electric signal distributer; P. H. Fisk, North Branch, Minn.

583,043 Electric heel-plate; J. W. Gibbs, New York, N. Y.

583,060 Electric arc lamp; F. A. La Roche, New York, N. Y.

583,104 System of generating and using hydrogen gas and electricity; L. H. Wattles, Providence, R. I.—A generator, or series of generators of hydrogen gas and electricity, the electric conductors connected with the electrodes of the generator or generators, the electric dynamo motor mechanism connected with the electric conductors, a gas duct connected with the gas collector or collectors of the generator or generators, a gas engine having connection with the gas-duct and adapted to be operated by the gas from said generator or generators, and the mechanisms of the engine and motor for the delivery of the mechanical power produced by the engine and motor, being connected to the same shaft or means of utilization.

583,109 Electric race horse carousel; J. W. Daniels, Paterson, N. J.

583,128 Galvanic element; P. Schmidt, Berlin, Germany.

583,132 Primary battery; H. M. Sutton, Dallas, Tex.

583,142 Telephone receiver support; L. Duque, San Francisco, Cal.—Comprises an offstanding supporting rod having a threaded outer tip extremity, and an oblong holding cage or basket, provided at diametrically opposite sides with fixedly positioned, interiorly threaded sockets disposed reversely to each other, and at an angle to the transverse center of the cage or basket.

583,160 Max mum and minimum recording electric meter; A. Wright, Brighton, England—The method of recording an extreme limit of the range of a variable characteristic of an electric current, within a certain period of time, by causing a movement of a body, or bodies, commensurate therewith; indicating, by the extent of such movement, the said limit, and preventing further record indicating movement of said body.

583,173 Emergency electric generating apparatus; C. E. Emery, Brooklyn, N. Y.—Consists of a constant potential dynamo and a prime mover for operating the same, of a series dynamo in parallel therewith, operated by a racing prime mover.

583,178 Underground electro-magnetic railway system; J. Hoffman, Schenectady, N. Y.—Consists of a feeding-wire and a contact-rail of separated contact-boxes, each provided with a horizontal extension projecting toward the feeding-wire, a movable electro-magnetic contact device within each contact-box, and a flexible conductor for conveying the current from the feed-wire to the said movable contact device, inclosed partly within the extension.

583,204 Incandescent lamp; A. Swam, New York, N. Y.

583,208 Automatic fire igniter for fire engines; G. J. Brown, Chelsea, Mass.—An electric burner, magnets therein, means actuated by the movement of the engine to close the circuits of the magnets and to break the said circuits after the magnets have been energized.

583,210 Electric motor; J. Connor and J. R. McMillan, Philadelphia, Pa.

583,213 583,214 Electric warp-stop motion for looms; R. J. Mommers, Manchester, Ct.

583,249 583,250 Electric furnace and method of operating same; A. H. Cowles, Cleveland, Ohio.

583,255 Cathode for electrolysis; E. Auguste, Georges street, Paris, France.

583,264 Electric motor or dynamo electric machine; R. Lundell, Brooklyn, N. Y.—An electric motor having a field magnet composed of two duplicate cylindrical inclosing magnetic shells, having inwardly projecting wedge-shaped pole pieces and legs or supports all cast integral, with a single field magnet coil which fills the entire space made by the united shells and the inwardly projecting pole pieces.

583,273 Series-multiple controller; T. von Zweiberg, Cleveland, Ohio.

583,303 Electric gas lighting attachment; W. H. Fargo, San Francisco, Cal.

583,305 Operating mechanism for car bells; J. T. Haskins, Malden, Mass.

583,309 Bond for electric railways; J. McLaughlin, Chicago, Ill.—A terminal head or heads, and a pin or key held permanently in said terminal head by casting or forming the head about the key or pin, and means for expanding and locking the head by driving the pin or key.

583,316 Electric lamp hanger; W. S. Weston, Chicago, Ill.

583,323 Method of and apparatus for charging storage batteries; C. C. Bramwell, Hyde Park, Mass.—Consists in having the number of cells in the charging circuit in direct proportion to the strength of said current, the discharging circuit of the cells remaining undisturbed throughout the operation.

583,324 Current collecting device for electric railways; W. M. Brown, Johnstown, Pa.—An electrically propelled vehicle and a magnet carried thereby, a flexible member depending below each magnet pole, and a spring between, and bearing against, the pole and flexible member.

583,407 Electric drill; C. E. Davis, Chicago, Ill.

583,418 Telegraphy; O. R. Roberson, Glen Ridge, N. J.

583,423 Electric signaling apparatus; A. D. Wheeler, Hyde Park, Mass.

## ELECTRICAL NEWS FROM THE WEST.

Kohler Brothers, Chicago, have just secured the agency for the Norton switchboard instruments, which have been on the market for some time and have gained quite a reputation for accuracy and reliability.

Mr. F. B. De Grass, of the Crocker-Wheeler Company, has returned from a week's visit to Chicago and other cities, where he has arranged for a somewhat more active and aggressive representation of the company's excellent products.

Mr. A. McN. Little, for the past year general manager of the Metropolitan Electric Company, Chicago, recently resigned his position and has started on an extended trip through Canada and the eastern States, which will probably result in his early identification with a prominent electrical concern.

W. Cary, of the Gibbs Electric Company, Milwaukee, spent a few days in Chicago last week, making headquarters at the offices of Kohler Brothers, the company's general agents. Mr. Cary reports the condition of his company's business as most flourishing, orders on hand being more than can be conveniently handled.

Mr. Frank P. Kennedy, representing the Hunter Fan and Motor Company, Fulton, N. Y., stopped in Chicago a few days last week, on his way south, where he claims the demand for the Tuerk ceiling fans to be better than in the city by the lake, where the fan-motor business so far seems to have suffered from the Spring frosts.

The American Rheostat Company, Milwaukee, has been compelled to run its factory overtime for some time past in order to keep up with the number of orders received. Among the more recent and important shipments made was a 200-horse-power, motor-starting box, with automatic release, sent to a prominent Chicago concern. We are informed that the fact of the apparatus operating with sparkless break and the general superiority of the starting box, secured the order in the face of a strong competition.

C. E. K.

Chicago, May 29.


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Manufacturers of
SPEAKING TUBES, WHISTLES, ANNUNCIATORS.
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REFERENCES: "Electrical Review," New York; Paul Cromlein, Teller Lincoln National Bank, Washington, D. C.; Judge Geo. D. Parker, Berkley, Va.; Second National Bank, Washington, D. C.; E. K. Leech, U. S. Mint, Philadelphia, Pa.; W. F. Newell, Manager and Secretary Water Works, Olympia, Oregon.

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$5.00 per doz. 60c. Single Stick.
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Agents for
Okonite Insulated Wires.
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Schiff, Jordan & Co.'s Ship Cored Carbons.
ELECTRICAL SUPPLIES OF EVERY KIND.

## THE CLOOS JUNCTION BOX.

FOR HIGH-POTENTIAL CIRCUITS.

It is generally conceded that in the operation of underground circuits for light and power distribution, the difficulty of maintaining a sufficiently high insulation of the system increases with the rise of electro-motive force employed. Where a system of underground cables can be operated without the necessity of making occasional additions, changes or repairs, it would perhaps be comparatively easy to permanently maintain a high insulation, but as long as new service mains have to be connected, feeders changed and sometimes reinforced, and alterations have to be made from time to time to suit the varying demands of the service, it becomes more and more important to not only keep up the insulation to the highest degree, but also to provide means for quickly locating trouble and, in case repairs or changes are needed, to make them without interfering in any manner with more of the distributing system than is absolutely necessary.

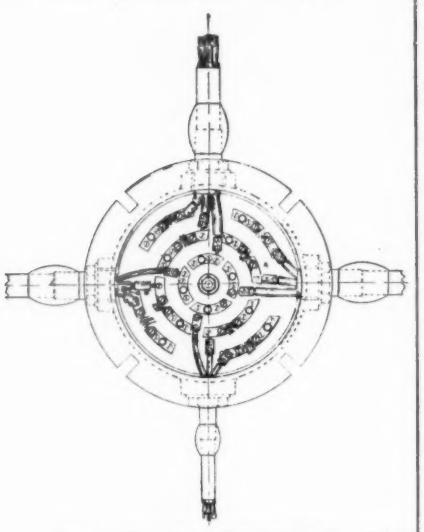

FIG. 1.—THE CLOOS JUNCTION BOX. PLAN OF A. C. TYPE.

The high-potential junction box, designed some time ago by Mr. Jacob Cloos, of Milwaukee, has recently been further perfected and improved, and is now designed to cover all cases of high-potential work, either alternating or direct current, up to 10,000 volts. The illustration shows arrangement of the latest type of box. It consists essentially of two marble disks, supported by a center bolt, which is surrounded by an insulating tube of hardwood, boiled in paraffine. This tube serves as a distance piece between the disks, as well as to keep them parallel. Upon the lower disk are mounted concentric conducting rings of steam metal. At four equidistant points on each ring are cast projecting lugs, bored accurately to receive the ends of the connecting plugs, which, when pushed through conducting segments on upper plate, complete the circuit. It will readily be seen that by providing a proper number of segmental projections on the upper disk, bored to correspond with the holes in lower lugs, any desired combination between feeders and branches can be made by a proper placing of plugs. The latter are made of hard-rolled brass, split quartering and have hardwood handles boiled in paraffine. The box is filled with a high grade of insulating oil (mineral seal), absolutely pure, to within two inches of cable entrances, and the cover being secured by means of a lead gasket and holding screws makes entrance of moisture absolutely impossible. This box, we are informed, has been subjected to the most severe tests under pressures up to 10,000 volts without the least sparking or arcing between contacts being observable. In Milwaukee a number of these junction boxes have been in use, we are told, for the past seven months on a 2,400 volt two-phase system, being under current 24 hours per day, some of them at times completely submerged under water for weeks at a time without the slightest leakage or breakdown of any kind occurring. The cable entrances of the box are fitted with brass bushings, bored to fit the outside diameter of lead cable, which, however, is stripped of the covering within the box up to inner edge of bushing. The latter is screwed in place with a metal gasket and a wiped joint made between the outside cable and box. This not only makes an absolutely water-tight joint, but at the same time provides such an effective path for the static current—to which all lead-covered cables are more or less subjected to—that on even the highest voltages not the faintest discharge can be discovered outside of the box.

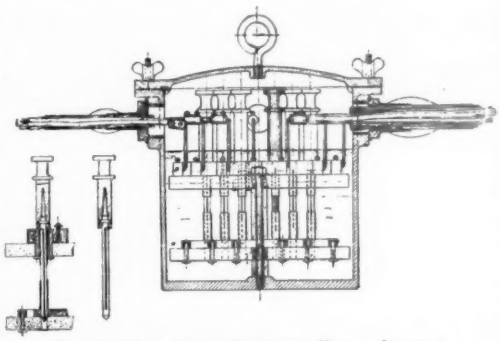

FIG. 2.—THE CLOOS JUNCTION BOX. SECTION OF A. C. TYPE.

The American Impulse-Wheel Company, of New York city, has issued an attractive book which, besides giving a clear and exhaustive exposition of the Gazin power wheel, is full of information of value to hydraulic engineers. It also contains a number of convenient tables, and has extracts of the laws bearing on water rights. To all who are interested in the utilization of water power, and the machinery therefor, the book will prove an acquisition. The company reports a satisfactory outlook in its special line.


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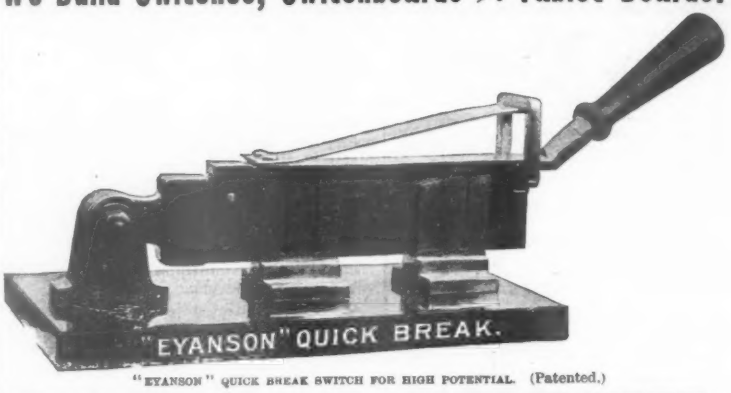


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No ACTION until Water is added, hence can be kept in stock for years.
Especially adapted for Export, as EXTREMES of TEMPERATURE will not affect it.
For open-circuit work only.
E. M. F. 1.50 on open circuit. } Guaranteed.
Amperage 3. on short circuit. }
Size, 5⅝x2½ inches; Weight, 1¼ lb., Price, 50 cents.
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*Read List carefully for changes each week.*

# FOR SALE.

**RAILWAY GENERATORS.**

3 M. P. 500, 666 horse-power, 500-volt generators with station equipments.
4 D 62, 80 horse-power, 500-volt generators with station equipments.
3 M. P. 75, 100 horse-power, 500-volt generators with station equipments.
1 D 50, 55 horse-power, 220-volt generator with station equipment.
2 60 Kilowatt, 500 volt, Edison generators.

**RAILWAY MOTORS.**

10 W. P. 50, 25 horse-power motors.
15 F. 30, 15 horse-power motors.
10 G. E. 800 drum armatures, 4 turn. New.
10 G. E. 800 drum armatures, 3 turn. New.
2 S. R. G. T.-H. Motors.

**STATIONARY MOTORS.**

| | | | | |
|---|---|---|---|---|
| 1 | 1½ | horse-power, | 110 volt, | Thomson-Houston. |
| 1 | 1½ | " | 220 " | Robinson-Foster. |
| 2 | ½ | " | 220 " | Edison. |
| 1 | 3 | " | 220 " | Edison. |
| 1 | 3 | " | 220 " | Thomson-Houston. |
| 1 | 15 | " | 220 " | Belknap. New. |
| 2 | 1 | " | 500 " | Ketchum. New. |
| 1 | 1¾ | " | 220 " | C. & C. |
| 1 | 5 | " | 220 " | Am. Eng. Co. New. |
| 1 | 50 | " | 220 " | Thomson-Houston. |
| 1 | 1 | " | 220 " | Ketchum. |
| 1 | 2 | " | 500 " | " |
| 1 | 5 | " | 500 " | Holtzer-Cabott. |
| 1 | 6 | " | 500 " | Bates. |
| 1 | 9 | " | 500 " | Edison. |

And many other motors not mentioned above.
All motors have sliding base frames and fire-proof rheostats.

**ELECTRIC PUMP.**

A 10-horse-power, 500-volt Thomson-Houston motor, direct connected to Gould pump, capacity, 10,000 gallons per hour.

**TRANSFORMERS.**

A large lot of Stanley transformers, from 15-light to 100-light, 1,000-volt primary; part 50-volt secondary, and part 100-volt secondary.

**125-VOLT INCANDESCENT DYNAMOS.**

| | | | | |
|---|---|---|---|---|
| 4 | 6 | Kilowatt, | 110-light, | Edison. |
| 3 | 12 | " | 210 " | " |
| 1 | 15 | " | 270 " | " |
| 2 | 20 | " | 360 " | " |
| 1 | 30 | " | 540 " | " |
| 1 | 8 | " | 125 " | T.-H. "C. I." |
| 1 | 16 | " | 275 " | " "E. I." type. |
| 1 | 25 | " | 450 " | Edison. |
| 3 | 30 | " | 540 " | T.-H. "H. I." " |
| 1 | 1,000-light M. P., Westinghouse. | | | |

**ALTERNATING FAN MOTORS.**

| | | | | |
|---|---|---|---|---|
| 6 | 104 | volt, | 125 Cycle, | Holtzer-Cabott. |
| 1 | 104 | " | 125 " | Gen. Elec. Co. |
| 2 | 52 | " | 125 " | Emerson. |

**ALTERNATING DYNAMOS.**

| | | | |
|---|---|---|---|
| 1 | A 35, | 650-light, | Thomson-Houston. |
| 1 | A 70, | 1,300 " | " |
| 1 | 650-light, | Westinghouse. | |
| 2 | 750 " | " | |

The above are all 1,000-volt machines, and are complete with exciters and station equipment.

**ARC DYNAMOS.**

| | | | |
|---|---|---|---|
| 1 | 5-light, | 2,000 candle-power, | Brush. |
| 1 | 5 " | 1,300 " | " |
| 1 | 20 " | 2,000 " | " |
| 4 | 30 " | 2,000 " | " |
| 1 | 65 " | 2,000 " | " |
| 2 | 50 " | 2,000 " | Thomson-Houston. |
| 4 | 45 " | 1,200 " | " |
| 1 | 30 " | 2,000 " | " |
| 2 | 30 " | 1,200 " | " |
| 1 | 75 " | 1,200 " | " |

**ARC LAMPS.**

10 1,200 candle-power, single. Brush.
27 No. 17, 1,200 candle-power, double Brush.

**EVERY MACHINE TESTED AND GUARANTEED.**

**FRANK RIDLON COMPANY,**

**180 SUMMER ST., BOSTON, MASS.**

## THE INDEPENDENT TELEPHONE COMPANIES.

(Continued from page 555.)

tion at that time; that said committee report a plan and basis for a union of both the operators and users of telephones and telephonic apparatus and manufacturers thereof; that said committee issue a call to all the known manufacturers of opposition telephonic apparatus in the United States, asking them to meet at the time and place as the meeting of the operators hereinbefore provided for, and then and there to confer with reference to a union of the two interests.

This resolution was unanimously adopted.

Mr. J. L. Stone, Rushville, Ind.: Before the motion for adjournment is put I desire to make a motion. I am pleased to congratulate the convention upon the good work they have done here, and I believe we are on the right track, and I believe that good results will be obtained. We were brought together here by Mr. Keelyn, and it was through his effort that we were gathered here, and if we form a national association that shall be productive of good to us and the independent telephone exchanges, the prime mover in this was Mr. Keelyn. In view of the interest he has taken in this matter and the very impartial manner in which he has acted, I move that the thanks of this convention be tendered Mr. Keelyn.

Unanimously carried.

Mr. Keelyn: I appreciate and thank you for your kindness.

It was voted to adjourn, to meet in Detroit, Mich., June 22, 1897.

While the meeting was probably not so well attended as had been anticipated by many interested in this movement, a sufficient number of telephone people had come from all parts of the United States to warrant the prediction that the Detroit meeting will result in a strong organization of the independent telephone interests. Among those present were noticed the following:

A. T. Averill, Cedar Rapids, Iowa.
A. J. Bertchey, Bloomington, Ill.
D. M. Burke, Carbondale, Ill.
C. M. Brock, Fairfield, Ill.
E. L. Baker, Zanesville, Ohio.
Geo. W. Beers, Fort Wayne, Ind.
S. S. Creider, Sterling, Ill.
H. D. Critchfield, Mt. Vernon, Ohio.
Hugh Daugherty, Bluffton, Ind.
J. D. Doudna, Barnesville, Ohio.
E. H. Ernst, Bluffton, Ind.
Geo. W. Fair, Crisinan, Ill.
P. G. Farrow, Paris, Ill.
Louis Feeder, Cincinnati, Ohio.
W. H. Gilbert, Saginaw, Mich.
F. W. Graduffe, Oak Harbor, Ohio.
E. T. Griffith, Muncie, Ind.
S. G. Higgins, Saginaw, Mich.
Albert Howell, Hillsboro, Ill.
A. W. Heiss, Perry, Iowa.
W. R. Hind, Fairfield, Iowa.
G. Heddner, Fort Wayne, Ind.
Wm. Hoyle, Cambridge, Ohio.
A. F. Hensch, St. Mary's, Ohio.
W. L. Keiser, South Bend, Ind.
Angus Leek, Cairo, Ill.
I. A. Lumpkin, Mattoon, Ill.
D. B. Moore, Olney, Ill.
A. A. Moore, Marshalltown, Iowa.
E. H. Martin, Webster City, Iowa.
T. A. Marshall, Keithsburg, Ill.
H. E. Mathews, Huntington, W. Va.
Dan A. Morseman, Huntington, W. Va.
J. D. McConnell, Hyde Park, Ill.
J. D. Pugh, Shelbyville, Ind.
L. P. Padgett, Columbia, Tenn.
C. A. Peterson, Manchester, Iowa.
A. L. Ramsey, Crawfordsville, Ind.
H. E. Rawson, Maryville, Mo.
L. D. Robinson, Washington, Iowa.
J. L. Stone, Rushville, Ind.
W. B. Seaton, Ashland, Ky.
J. A. Stunnington, Parker, S. D.
S. T. Slade, Oskaloosa, Iowa.
P. K. Smith, Paynesville, Ohio.
C. L. Thurber, Columbus, Ohio.
C. Truitt, Columbia, Mo.
J. M. Thomas, Chillicothe, Ohio.
W. J. Vesey, Fort Wayne, Ind.
G. S. Van Dusen, Michigan City, Ind.
J. G. Wright, Maysville, Ky.
H. F. Wellman, Cattlettsburg, Ky.
H. C. Young, Columbia, Pa.

In addition several manufacturers of telephone apparatus, supplies and material were represented, among them being the American Electric Telephone Company, the Stromberg-Carlson Telephone Manufacturing Company, Electric Appliance Company, Farr Telephone and Construction Supply Company and the Connecticut Telephone and Electric Company.

## VARIOUS ELECTRIC LIGHT CONVENTION HEADQUARTERS.

The Keystone Electrical Instrument Company will be located in Parlor E, Cataract House, Niagara Falls, during the coming convention of the National Electric Light Association. They will have on exhibition a full line of their instruments and will endeavor to make things interesting and pleasant for their friends.

The General Electric Company will have its headquarters at the International and will be represented by a large staff. Over 40 rooms have been engaged by this company.

The Westinghouse Electric and Manufacturing Company will have its headquarters at the International Hotel. A large number of rooms have been engaged for its staff.

The ELECTRICAL REVIEW will have its headquarters in Parlor H, International Hotel.

The John A. Roebling's Sons Company will be represented by the secretary of the company, Mr. H. L. Shippy, and others. Mr. Shippy will be greeted by friends without number.

The Okonite Company, Limited, will be represented by Capt. W. L. Candee and Col. Geo. T. Manson, and these well known young men will make their headquarters at the International.

The American Electrical Works, of Providence, will be represented by Mr. P. C. Ackerman, a good man who weighs 137 pounds.

Among the many companies who will have headquarters at the International and Cataract are the Fort Wayne Lamp Company, the Standard Underground Cable Company, Western Electric Company, Sunbeam Lamp Company, India Rubber and Gutta Percha Company, Paragon Fan Company, Jewell Belting Company, Bryant Electric Company, Cutter Electric Manufacturing Company, Hugo Reisinger, Walker Company, Wagner Company, Westinghouse Company, General Electric Company, Thomson-Houston Carbon Company, Bernstein Electric Company, Weston Electrical Instrument Company, New York & Ohio Company.

### New Offices of the Electric Storage Battery Company.

The New York offices of the Electric Storage Battery Company have been removed to the new Commercial Cable Building, 30-32 Broad street and 18-20 New street. Mr. Charles Blizard is the New York manager of this company.

### The Central Electric Company.

The conservatism that pervaded earlier mercantile transactions as well as the limited field and facilities for business frequently prevented the rapid establishment of large mercantile houses. Present improved methods and facilities contribute to much more rapid growth, and it is not infrequent that establishments starting on correct business principles, with plenty of push and energy, have been enabled to reach a high degree of success within a much shorter time.

The Central Electric Company, Chicago, is announcing its first decade. Starting in 1887 in very modest and unassuming quarters, it has, in its 10 years of life, by strict attention to and appreciation of the wants of its trade, built up an enormous business in its short career, standing to-day as the representative electrical supply house of this and probably other countries.

### Injunction Against the Ohio Brass Company.

The General Electric Company has obtained a preliminary injunction against the Ohio Brass Company, of Mansfield, Ohio, on the Van De Poele patents, on the under-running trolley and switch, the lower United States court having decided in favor of the injunction, and its decision having been sustained by the United States Court of Appeals. The case will now go to trial on its merits. A number of suits have already been decided in favor of and sustaining the patents owned by the General Electric Company on this series of inventions.

### A Big London Contract for General Electric Apparatus.

The Central Underground Railway, of London, is to be equipped with electric motive power, the apparatus for which will be manufactured in this country. A cablegram states that a contract was signed in London last week with the Underground road by E. W. Rice, Jr., the representative of the General Electric Company. The amount of first installation of the power under the contract is about $700,000.

### A Handsome Telephone Catalogue.

The Stromberg-Carlson Telephone Manufacturing Company, Chicago, has just issued an illustrated catalogue, descriptive of its apparatus and accessories. The pamphlet is not only one of the most attractive typographically, but in it the merits of the company's apparatus are set forth in such a convincing manner as to at once gain the confidence of the readers. Unlike some of its competitors, the company has abandoned the time-honored trade catalogue, incorporating in the pamphlets pages instead, a brief description of its apparatus and presenting in a "deadly parallel" a digest of the telephone patent situation, as applying to Bell apparatus and its own products. In the preface, the company presents in plain language some facts which, to say the least, should prove interesting reading, not only to those intending the purchase of telephone apparatus, but to any one even remotely interested in the telephone patent situation, as it stands after the so-called "Berliner" decision.

C. E. K.

Chicago, May 29.


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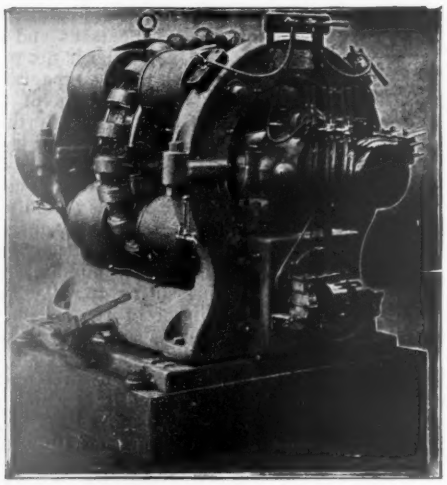

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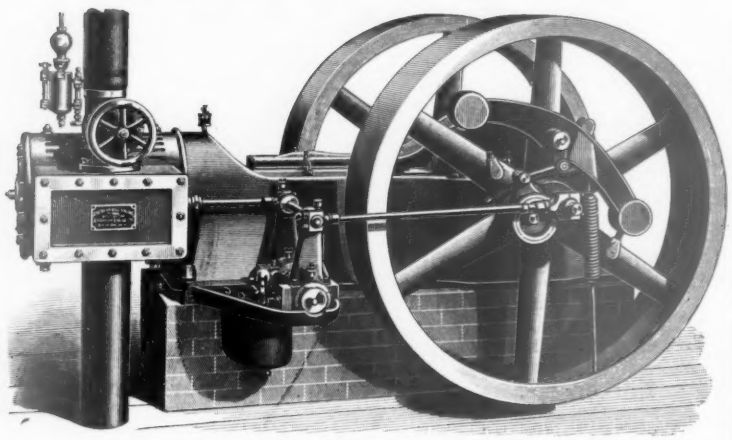

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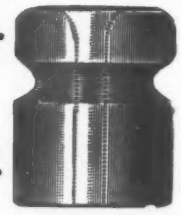

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